HEFS Test Manual

HEFS Release 1.1.1

April 17, 2014

National Weather Service

Office of Hydrologic Development

Revision History

Date	Version	Description	Author
09/16/2013	1.0	Initial Draft	Shaif Hussain
09/17/2013	1.1	Final Version	Shaif Hussain
12/02/2013	1.2	Updated for HEFS 1.0.2	Shaif Hussain
04/17/2014	1.3	Updated for HEFS 1.1.1	Shaif Hussain

Contents

1. Test Objective

Testers will test on a Standalone that is already configured with HEFS. Testers will verify whether the HEFS components are working as intended. The components to be tested are Data Ingest, MEFP & EnsPost Parameter Estimation (PE), MEFP forecast, EnsPost, and GraphGen.

A prerequisite of this test is installing and configuring CHPS 4.0.1 and HEFS 1.1.1 (see associated install notes), updating or re-estimating the MEFP parameters, and converting or re-estimating the EnsPost parameters.

This test manual has three testing sections to be tested by different sets of HEFS RFCs. Section 2 is a test of existing functionalities for all RFCs to test. Sections 2.1, 2.2 and 2.3 are optional as re-estimation of parameters is not required for this release. Section 3 is a test of all the fixes which should be tested by the reporting RFCs; see the table at the beginning of the section for which RFCs are responsible for which tests and if a test procedure is provided. Section 4 is a test of the enhancements in this release, see the table at the beginning of the section for which RFCs are responsible for which tests and if a test procedure is provided. Some fixes and enhancements are tested as part of running the HEFS workflows and don't need any additional steps to test and therefore does not have any test procedures.

1.1. Directories of Note

The following directories will be referred to in the instructions provided below:

- <*region_dir*>: The *installation stand-alone* region home directory, typically "##rfc_sa".
- <*configuration_dir*>: The stand-alone Config directory, typically <*region_dir*>/Config.
- <*tar_root_dir*>: The directory where the release package was untarred.
- <*mefp_root_dir*>: The directory selected to hold CFSv2 location time series files and MEFP parameter files; see the *MEFP Configuration Guide: Data Ingest Components*.

1.2. Test Summary:

For Section 2 each test consists of two sections: Test Prerequisites and a Test Procedure.

- **MEFP Data Ingest**
  Data ingest workflows prepare gridded forecast inputs to MEFP. This test will run the workflow for the data ingest components and verify the result using the FEWS GUI.

- **MEFP PE**
  The MEFP Parameter Estimator (MEFPPE) is a FEWS explorer plug-in designed to guide the user through the process of estimating parameters for use with MEFP. This test will run the MEFPPE workflow using the FEWS GUI to estimate parameters and verify the results.

- **EnsPost PE**
  The EnsPost Parameter Estimator (EnsPostPE) is a FEWS explorer plug-in designed to guide the user through the process of estimating parameters for use with EnsPost. This test will run the EnsPostPE workflow using the FEWS GUI to estimate parameters and verify the results.

- **MEFP Forecast**
  The MEFP forecast workflow generates the forecast ensembles. This test will execute the workflow using the FEWS GUI to generate the forecast ensembles and verify the results.

- **EnsPost**
  The execution of the EnsPost workflow post processes stream flow ensembles. This test will run the workflow using the FEWS GUI to verify the installation was successful.

- **GraphGen**
  Delivered with the HEFS release of the MEFP and HEFS, EnsPost software is pre-configured Graphics Generator products designed to display MEFP Results for HEFS EnsPost Input and HEFS EnsPost Output. Using the FEWS GUI, this test will verify the installation was successful.

2. Testing Functionalities

2.1. MEFP Data Ingest (Optional)

2.1.1 Test Prerequisites

CHPS is configured with the data ingest components as described in the document *MEFP Configuration Guide: Data Ingest Components*. Below is the same information from the confirmation section of the configuration guide.

This test is designed to replicate exactly how the grid files will be imported when configured to run as an automated workflow. The data represents that which is available for an MEFP run on Jan 31, 2013 at 12Z. The grids are imported by system times (T0) as follows:

- GFS: 1/31/13 00Z
- GEFS: 1/31/13 00Z
- CFSv2: 1/31/13 12Z (the data is 24-hours old: 1/30/13 12Z)

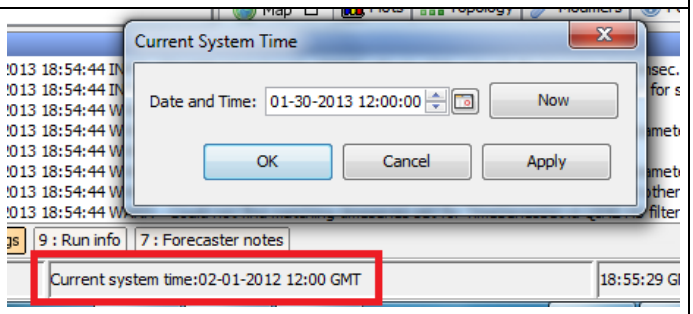
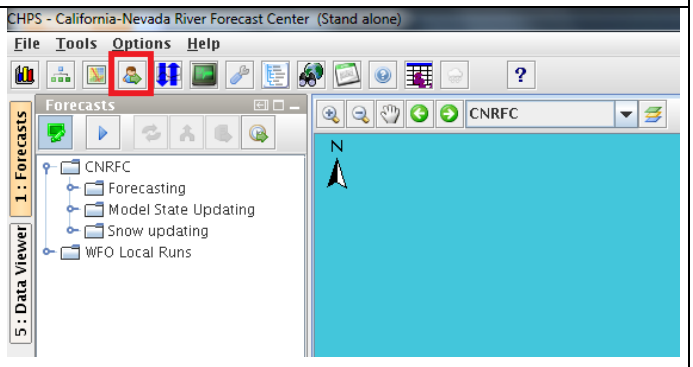
The test steps below describe how to view the gridded forecasts through the **Spatial Display Panel** of the CHPS interface.

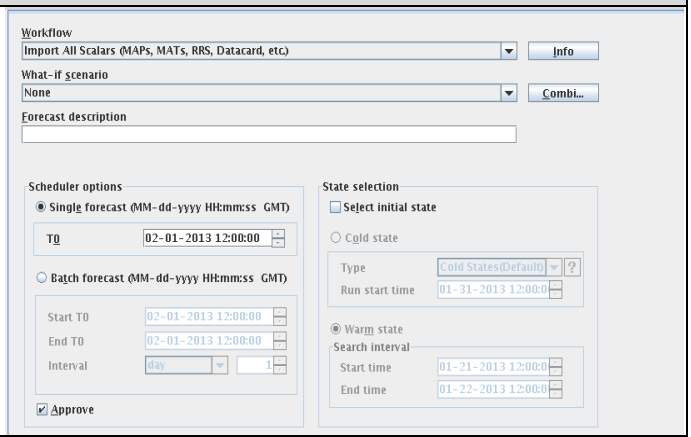
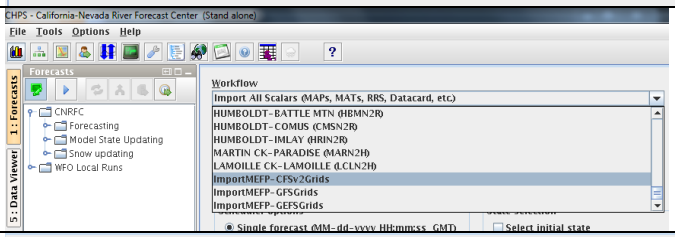
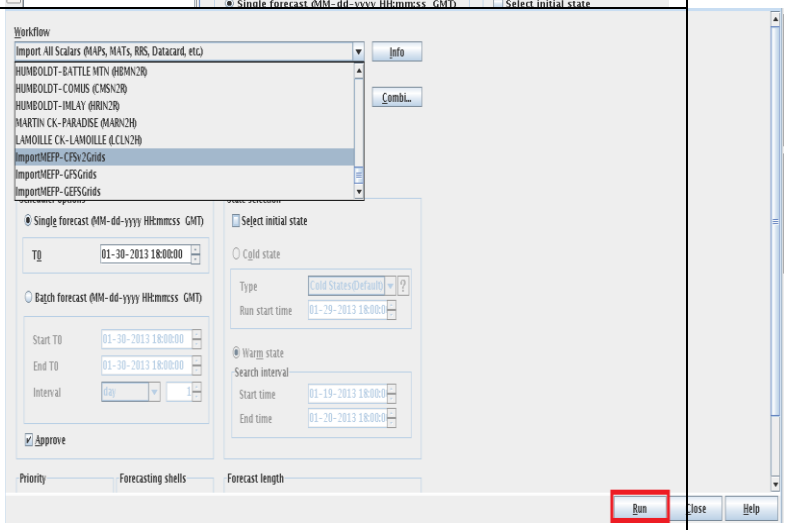
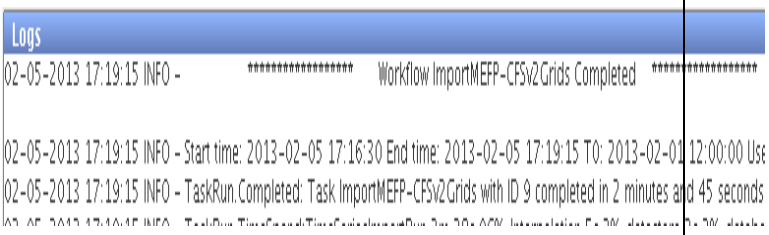
Prior to running the test, prepare the data for import as follows:

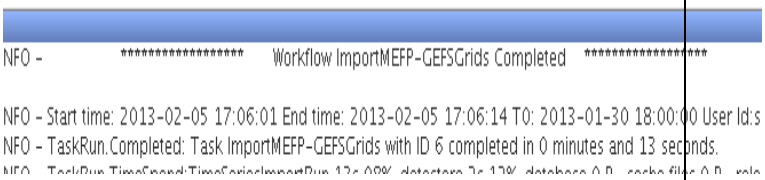
Action: Populate the <*tar_root_dir*>/dataIngest/Import directory with grid data for testing. Do the following:

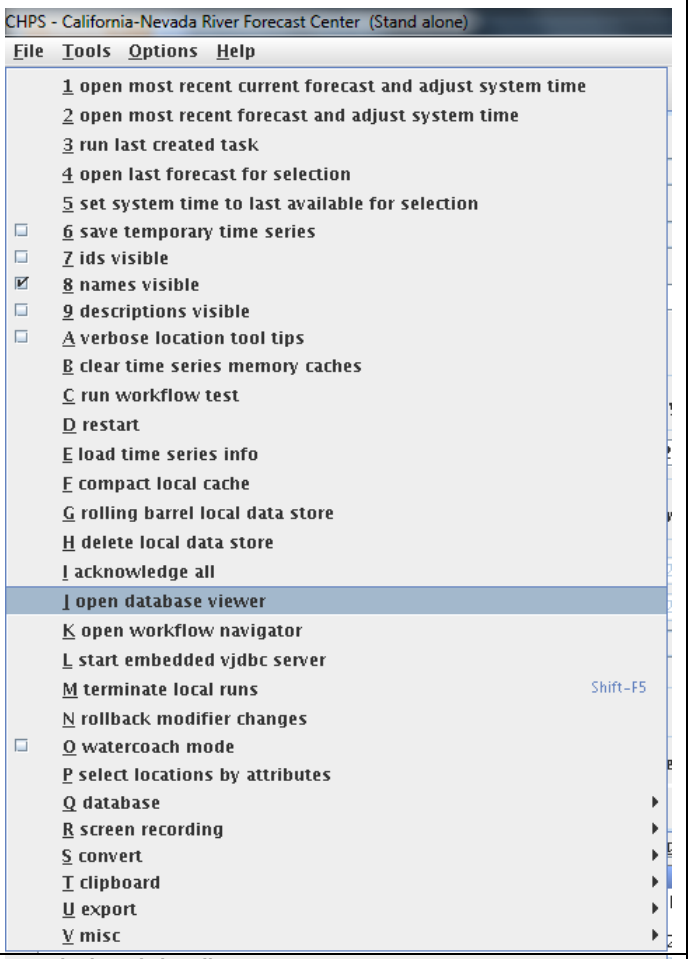
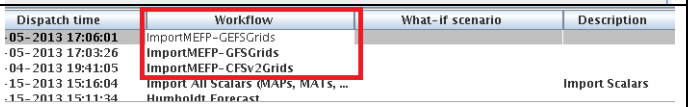
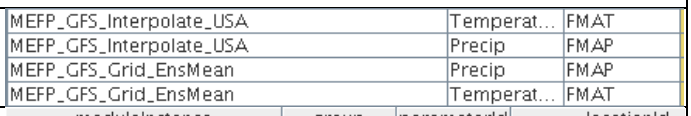
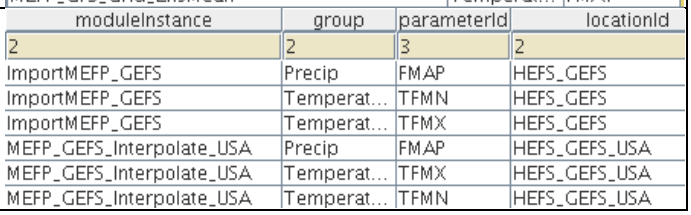
cd <*region_dir*>
tar –zxvf <*tar_root_dir*>/dataIngest/importTestData.tgz

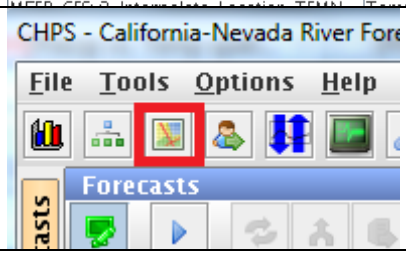
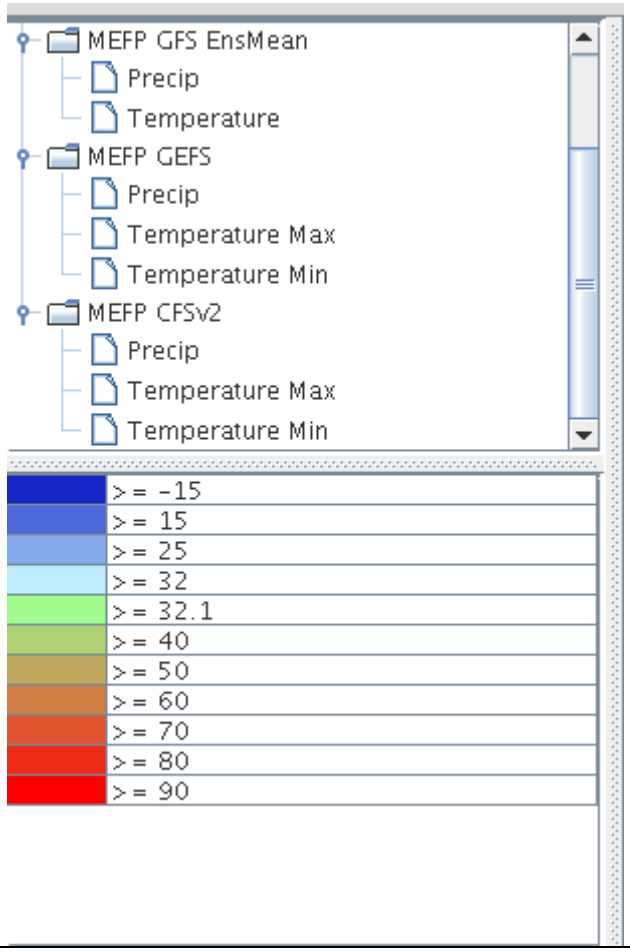
2.1.2 Test Procedure

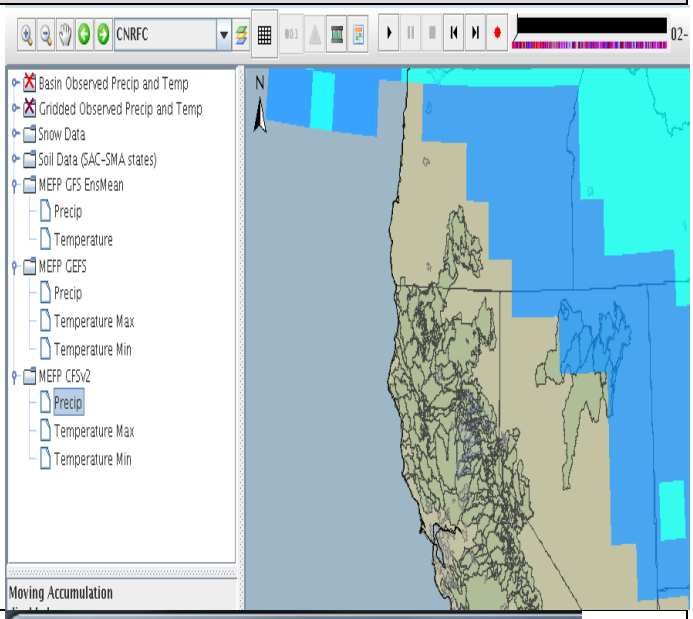
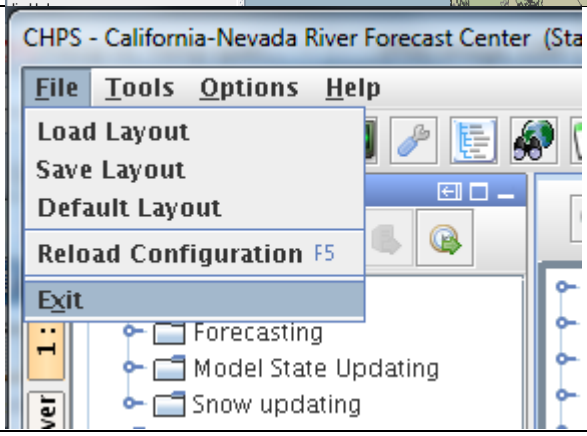
#	Action	Expected Results
1	Start FEWS using the installation standalone: ***cd*** *<region_dir>* ***cd ..*** ***./hefsPlugins/fews_hefsPlugins.sh ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.
2	Click on the **Current System Time Label** at the bottom of the CHPS interface so that the **Current System Time** dialog opens. Set the system time to 01-30-2013 12:00:00.	
3	Click on **Manual Forecast Button**.	

#	Action	Expected Results
4	The **Manual Forecast Panel** will open allowing you to select the workflow to run.	
5	In the **Workflow List**, select the ImportMEFP-CFSv2Grids workflow.	
6	Click **Run.**	
7	Wait for run to complete (up to 5 minutes)	We can see this in the Logs once run is complete: 
8	Verify that appropriate directories and files for each *installation catchment* were created under the directory <*mefp_root_dir*>/cfsv2Interpolated/archive.	If they were not created, then the module that exports the location-specific CFSv2 forecast time series file, or one of the preceding modules, failed to execute.

#	Action	Expected Results
8	Perform Step 2, again, but set the system time to be 01-31-2013 00:00:00.	
9	In the **Workflow List**, select the ImportMEFP-GFSGrids workflow.	
10	Click **Run.**	
11	Wait for run to complete (< 1 minute).	We can see this in Logs once run is complete: 17:03:39 INFO - ********** Workflow ImportMEFP-GFSGrids Completed ********** 17:03:39 INFO - Start time: 2013-02-05 17:03:25 End time: 2013-02-05 17:03:39 TO: 2013-01-30 18:00:00 User Id: shaifh 17:03:39 INFO - TaskRun.Completed: Task ImportMEFP-GFSGrids with ID 5 completed in 0 minutes and 13 seconds. 17:03:39 INFO - TaskRun.TimeSpend:TimeSeriesImportRun 12s 92% TransformationModule 0s 2% datastore 0s 4% database 0 B 17:03:39 INFO - Workflow.ActivityCompleted: Workflow 'ImportMEFP-GFSGrids' completed in 0 minutes and 12 seconds
12	In the **Workflow List**, select the ImportMEFP-GEFSGrids workflow.	
13	Click **Run.**	
14	Wait for run to complete (< 1 minute)	We can see this in Logs once run is complete:  NFO - ********** Workflow ImportMEFP-GEFSGrids Completed ********** NFO - Start time: 2013-02-05 17:06:01 End time: 2013-02-05 17:06:14 TO: 2013-01-30 18:00:00 User Id:s NFO - TaskRun.Completed: Task ImportMEFP-GEFSGrids with ID 6 completed in 0 minutes and 13 seconds.

#	Action	Expected Results
15	Click on the **Logs Panel** (to make it active) and press the F12 key.	A menu will appear: 
16	Select "**open database viewer**" (shortcut key: **J**).	
17	In the **Database Viewer Panel** that opens, select each workflow to verify there is data in the database.	
18	You should be able to see the EnsMean has been calculated for the GFS Workflow.	
19	This is what you should see in the GEFS workflow.	

#	Action	Expected Results
20	This is what you should see in the CFSV2 workflow.	moduleInstance / group / parameterId / qualifiers 4 / 2 / 3 / 1 MEFP_CFSv2_Interpolate_USA / Precip / FMAP MEFP_CFSv2_Interpolate_USA / Temperat... / TFMX MEFP_CFSv2_Interpolate_USA / Temperat... / TFMN MEFP_CFSv2_Interpolate_Location_FMAP / Precip / FMAP / CFSv2 MEFP_CFSv2_Interpolate_Location_FMAP / Precip / FMAP / CFSv2 MEFP_CFSv2_Interpolate_Location_FMAP / Precip / FMAP / CFSv2 MEFP_CFSv2_Interpolate_Location_TFMX / Temperat... / TFMX / CFSv2 MEFP_CFSv2_Interpolate_Location_TFMX / Temperat... / TFMX / CFSv2 MEFP_CFSv2_Interpolate_Location_TFMX / Temperat... / TFMX / CFSv2
21	Click **Spatial Button** in the toolbar of the CHPS interface.	
22	When the **Spatial Display Panel** opens, on the left, expand all three of the following: “MEFP GFS EnsMean”, “MEFP GEFS”, and “MEFP CFSv2”.	There should not be any red X’s on any of the expanded nodes (a red X indicates missing data) and the tree should appear similar to the screen shot below: 

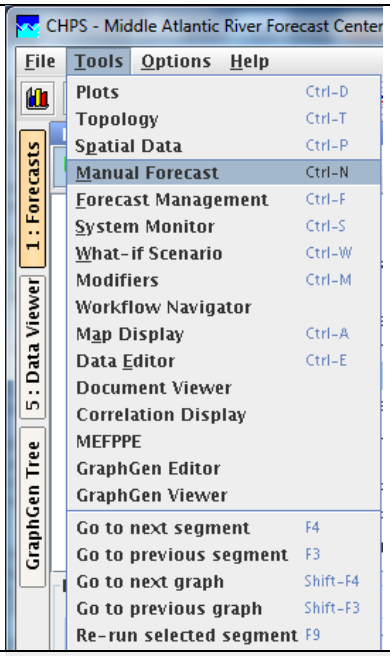
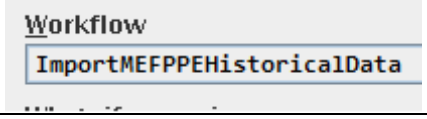
#	Action	Expected Results
23	Select each of the “Precip”, “Temperature”, and “Temperature Max/Min” nodes made visible in the last step and confirm that gridded data is displayed on the map to the right.	
24	From the **File Menu**, select “**Exit**” to close the standalone.	

2.2 MEFP PE (Optional)

2.2.1 Test Prerequisites

CHPS is configured with the MEFPPE components as described in the document *MEFPPE Configuration Guide*. Below is the same information from the confirmation section of the configuration guide. The directory <*configuration_dir*>/Import/mefppe_cardfiles should already be populated with MAP and MAT datacard files.

2.2.2 Test Procedure

#	Action	Expected Results
1	Start FEWS using the installation standalone: ***cd*** *<region_dir>* ***cd ..*** ***./hefsPlugins/fews_hefsPlugins.sh ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.
2	In CHPS, run the "**ImportMEFPPEHistoricalData**" workflow. Choose Tools (menu), Manual Forecast (menu option).	
3	Under Workflow (pull down menu), choose **ImportMEFPPEHistoricalData.** It may be the last Workflow.	

#	Action	Expected Results
4	Click **Run** (button). 	Output (in the CHPS log area) will have "Workflow ImportMEFPPEHistoricalData Completed", as shown in Figure 1 below. The historical MAP/MAT datacards have been imported.

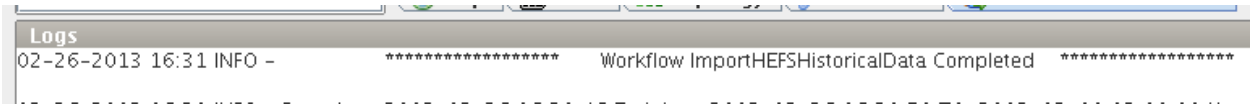
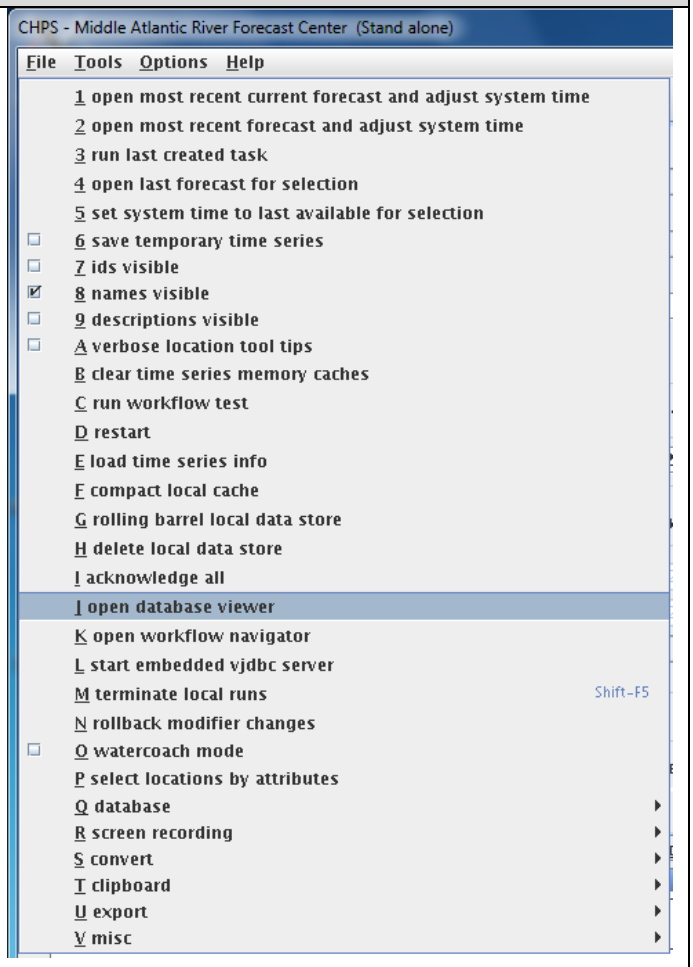
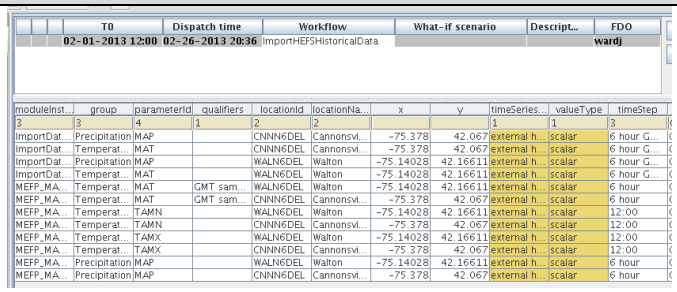
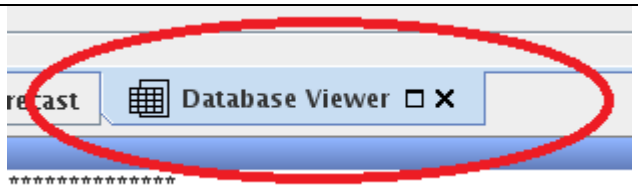
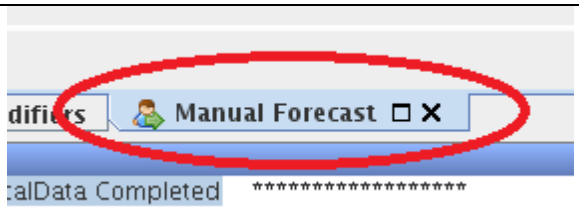
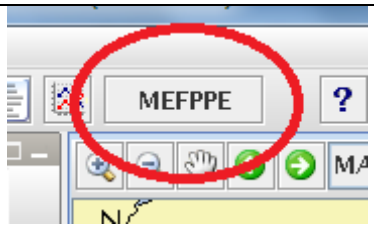
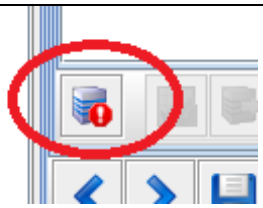
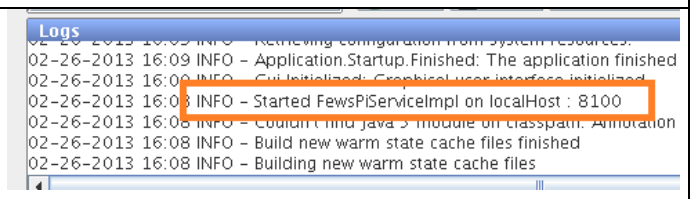
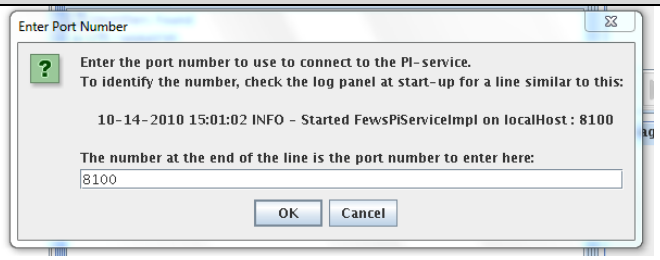
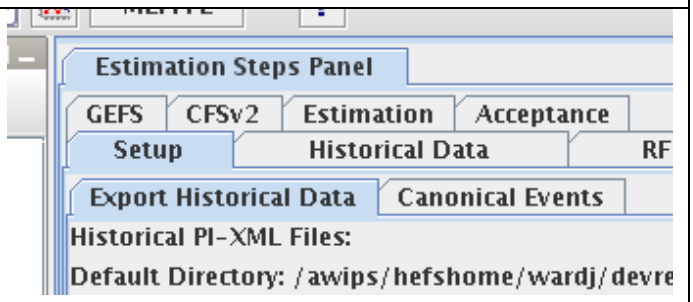
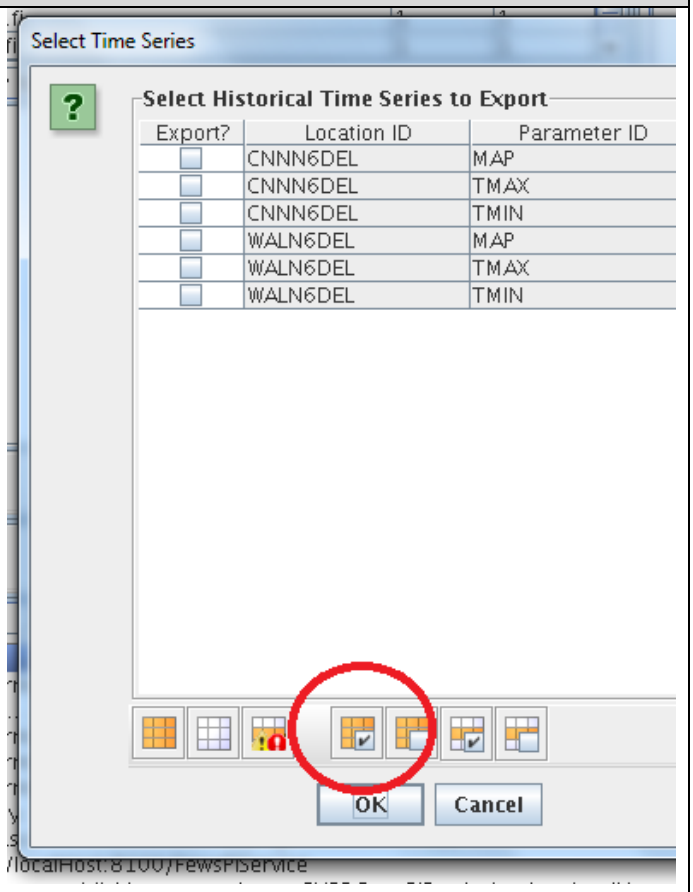


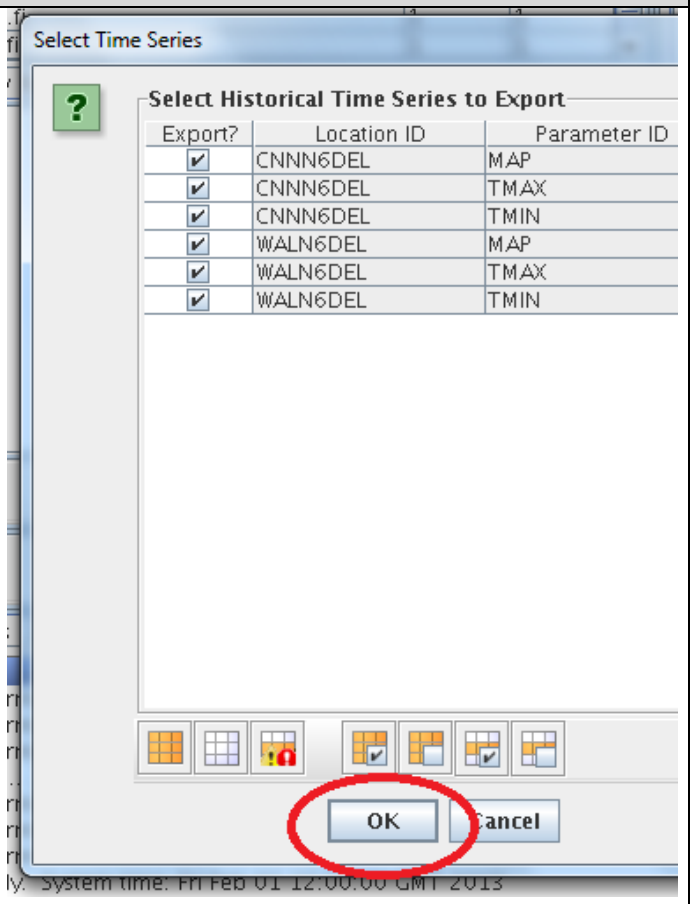
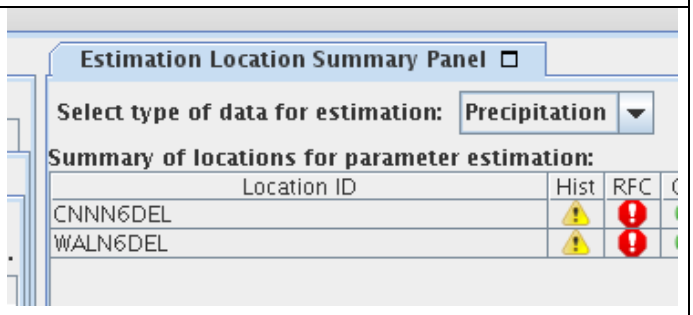
Figure 1

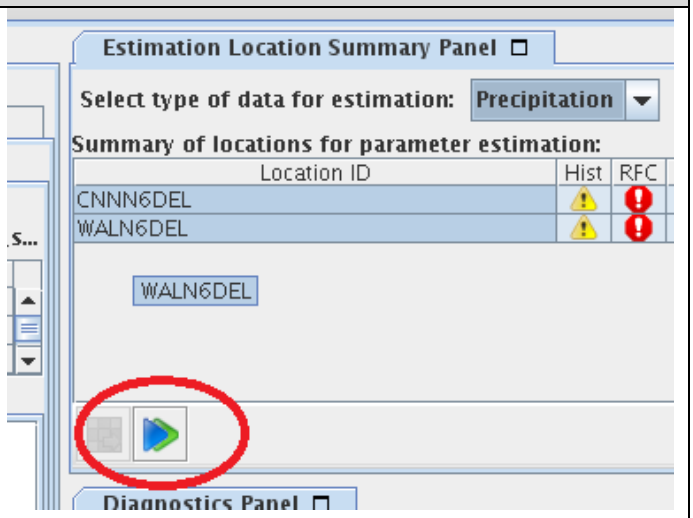
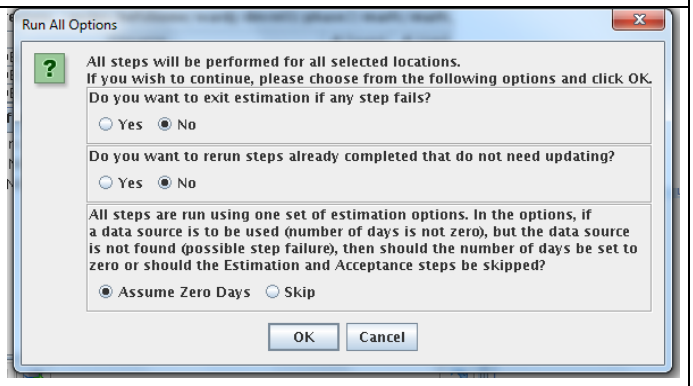
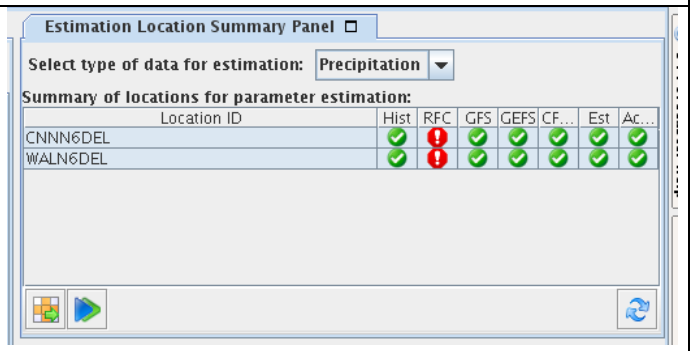
#	Action	Expected Results
5	Click in the CHPS **Logs Panel**, press the <F12 key>, and press the <**J**> key to open the **Database Viewer**.	

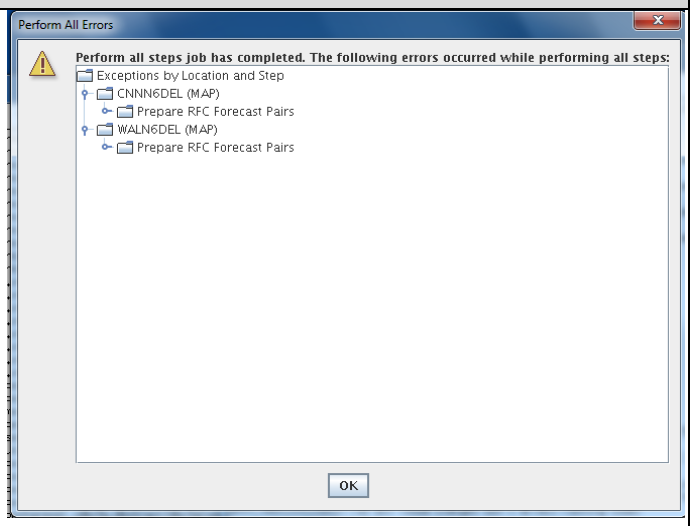
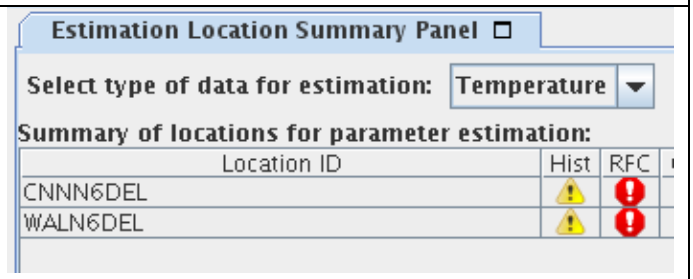
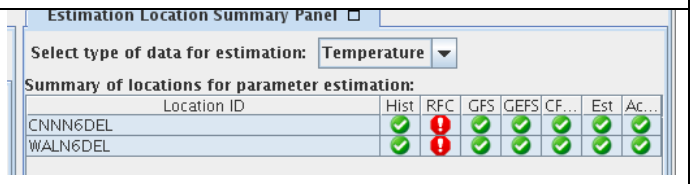
#	Action	Expected Results
6	Confirm that the imported datacard time series are present and that the imported data appears reasonable. To do so, use the standard **Database Viewer** tool to select the imported time series and view them.	
7	Close the **Database Viewer** by clicking on the X at the bottom of the panel.	
8	Close the **Manual Forecast Dialog** by clicking on the X at the bottom of the window.	
9	Start the MEFPPE by clicking on the **MEFPPE** Button in the toolbar of the CHPS interface.	
10	Unless Graphics Generator was installed in the *installation standalone*, MEFPPE will not be connected to the PI-service (see the screen capture to the right). If the MEFPPE is connected to the PI-service, skip to Step 6. The Picture on right shows the PI-service is not connected.	
11	Scroll the **Logs Panel** to find your PI-service port number, looking for a log message that starts with “Started FewsPiServiceImpl on localHost…”	

#	Action	Expected Results
12	Click on the **Reconnect to CHPS PI-service Button**, enter your PI-service port number (in this example 8100), and click OK.	
13	When successfully connected, the **Reconnect to CHPS PI-service** Button (highlighted in the red box) will show a green checkmark and the **Export Time Series from CHPS DB** Button (highlighted in the red box) will be enabled.	
14	Select **Export Historical Data** Tab in the **Setup** Subpanel of the **Estimation Steps Panel**.	
15	Click on the **Export Time Series from CHPS DB Button**.	

#	Action	Expected Results
16	Click on the **Check All Rows for Export** Button to check all rows in the table.	

#	Action	Expected Results
17	When all of the time series are selected, click **OK**.	
18	Select “Precipitation” in the **Select type of data for estimation** Drop down menu in the **Location Summary Panel**.	

#	Action	Expected Results
19	Shift + Click to select all rows and click on the **Run All** Button.	
20	Select **OK** in the **Run All Options** window. The parameters will be estimated from the Historical, GFS, GEFS, and the CFSv2 data sources. The RFC data source is not available. (If you wish to add RFC data, see Appendix B and Appendix C below.) A progress dialog will open to display parameter estimation progress. Parameter estimation may take a few minutes.	
21	When finished, all the boxes except RFC should be checked green in the **Summary of location for parameter estimation** Table**.**	

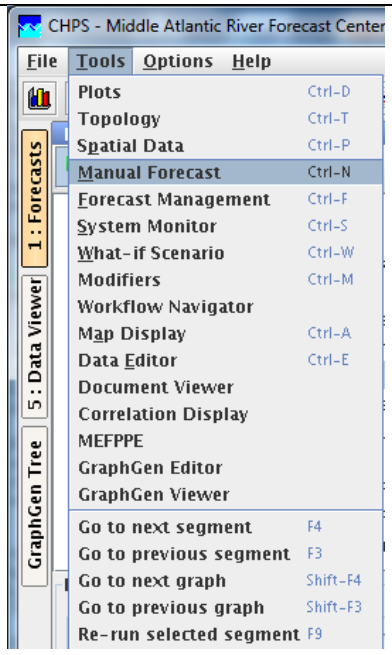
#	Action	Expected Results
22	You may see a **Perform All Errors Dialog** alerting you to missing RFC data. Click **OK**.	
23	As an additional check, the directory ***<mefp_root_dir>***/mefpParameters should contain the generated and accepted *.parameter.tgz files.	CNNN6DEL.precipitation.mefp.parameters.tgz WALN6DEL.precipitation.mefp.parameters.tgz
24	Select "Temperature" in the **Select type of data for estimation** drop down menu in the **Estimation Location Summary Panel** and perform steps 19 & 20 again.	
25	All the check boxes, except RFC, should be green.	
26	As an additional check, the directory ***<mefp_root_dir>***/mefpParameters should contain the generated and accepted *.parameter.tgz files.	CNNN6DEL.temperature.mefp.parameters.tgz WALN6DEL.temperature.mefp.parameters.tgz

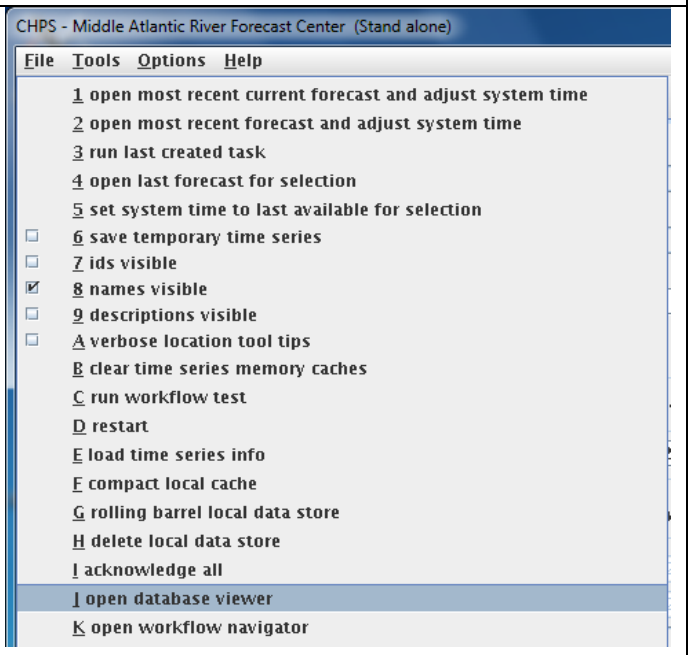
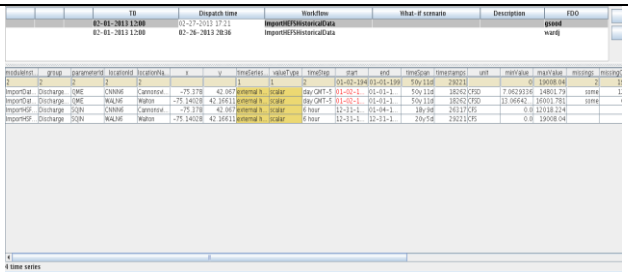
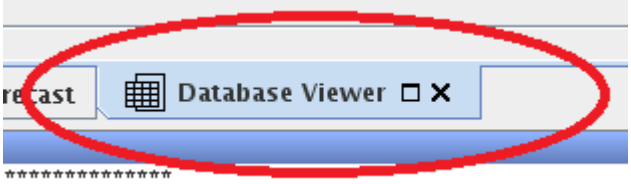
2.3 EnsPost PE (Optional)

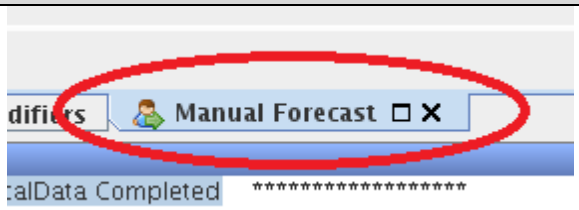
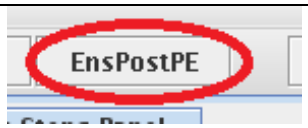
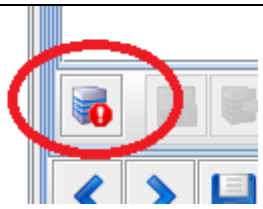
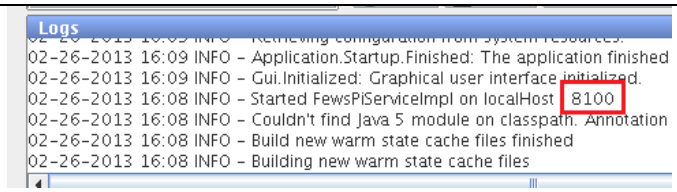
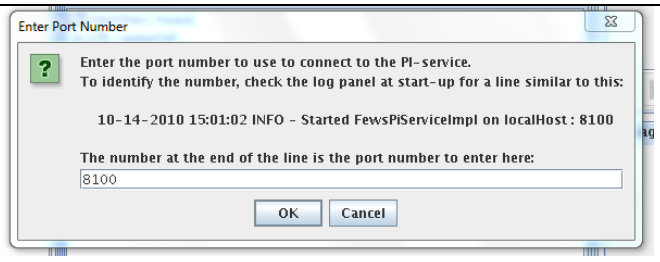
2.3.1 Test Prerequisite

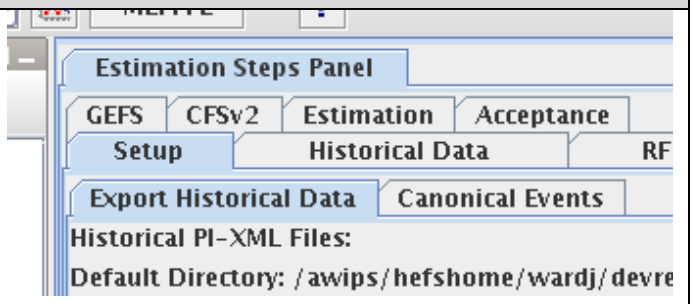
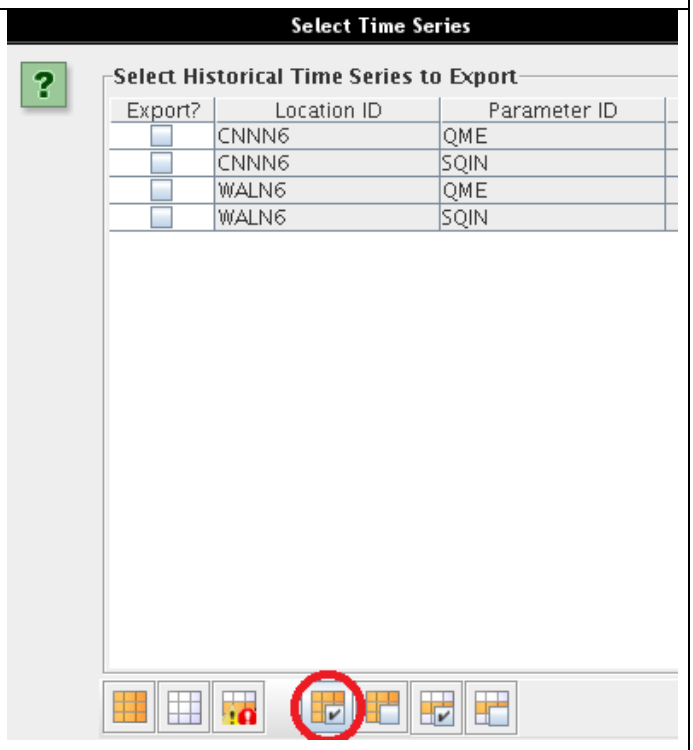
CHPS is configured with the EnsPostPE components as described in the document *EnsPostPE Configuration Guide*. Below is the same information from the confirmation section of the configuration guide. The directories should be populated with datacard files and pixml files.

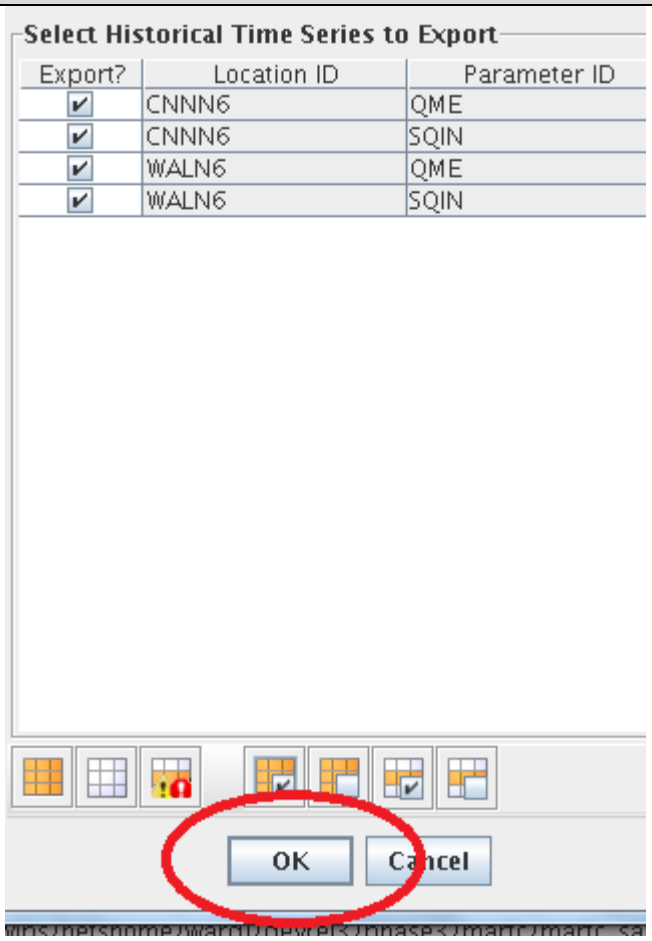
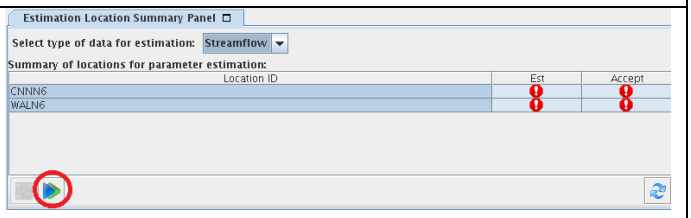
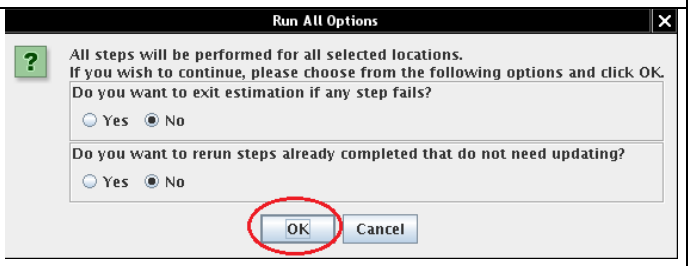
2.3.2 Test Procedure

#	Action	Expected Results
1	Start FEWS using the installation standalone: ***cd*** *<region_dir>* ***cd ..*** ***./hefsPlugins/fews_hefsPlugins.sh ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.
2	In CHPS, run the "**ImportEnsPostPEHistoricalData**" workflow. Choose **Tools** (menu), **Manual Forecast** (menu option).	
3	Under Workflow (pull down menu), choose **ImportEnsPostPEHistoricalData.** It may be the last Workflow.	

#	Action	Expected Results
4	Click Run (button). 	Output (in the CHPS log area) will have “Workflow ImportEnsPostPEHistoricalData Completed”. The historical datacards and simulated pixml files have been imported.
5	Click in the **Logs panel**, hit the F12 key, and hit the **J** key to open the **database viewer**. 	
6	The imported data should be present. 	
7	Close the **Database Viewer** by clicking on the X at the bottom of the window. 	

#	Action	Expected Results
8	Close the **Manual Forecast** by clicking on the X at the bottom of the window.	
9	Start the EnsPostPE by clicking on the in the toolbar of the CHPS interface. .	
10	The PI-service will be disconnected.	
11	Scroll the Logs panel to find your PI-service port number (here 8100).	
12	Click on the PI-service icon, enter your PI-service port number (8100 in this example), and click OK.	
13	When successfully connected, two database icons should be green.	

#	Action	Expected Results
14	**Select Export Historical Data** in the **Setup** subpanel of the **Estimation Steps Panel**.	
15	Click on the Export Time Series icon.	
16	Select all time series to export by pressing the "**Select All"** button.	

#	Action	Expected Results
17	When all of the time series are selected, click OK.	
18	Shift + Click to select all Location ID rows, and then click on the Run All double arrow.	
19	Select **OK** in the **Run All Options** window.	

#	Action	Expected Results
20	When finished, all the boxes should be checked green.	
21	As an additional check, the directory **<ens_post_root_dir>**/ensPostParameters should contain the *.parameter.tgz files.	CNNN6.SQIN.enspost.parameters.tgz WALN6.SQIN.enspost.parameters.tgz

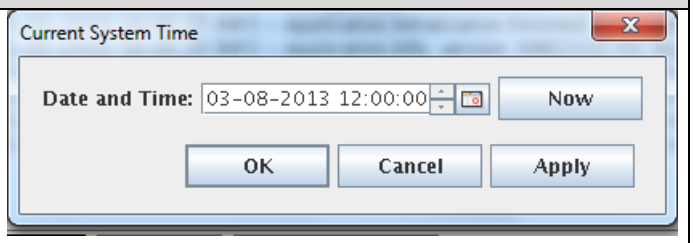
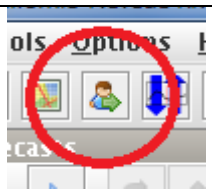
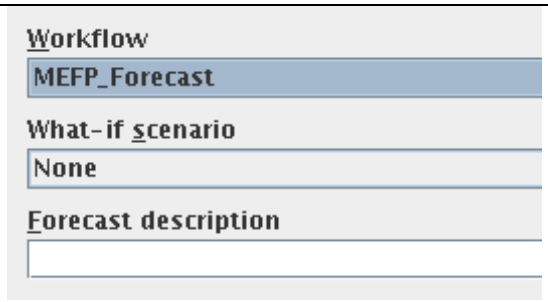
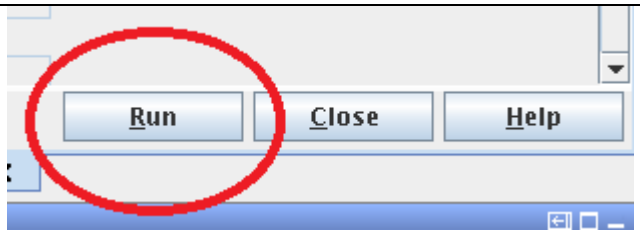
2.4 MEFP Forecast

2.4.1 Test prerequisite

CHPS is configured with the MEFP components as described in the document *MEFP Configuration Guide: Forecast*. Below is the same information from the confirmation section of the configuration guide. The data ingest components have been installed, and for a given forecast time (T0, system time), the GEFS and CFSv2 gridded forecasts must be present.

2.4.2 Test Procedure

#	Action	Expected Results
1	Start FEWS using the installation standalone: ***cd*** *<region_dir>* ***cd ..*** ***./hefsPlugins/fews_hefsPlugins.sh ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.

#	Action	Expected Results
2	Only perform this step if the current system time is not correct for testing. Click on the **Current System Time** label at the bottom of the CHPS interface so that the **Current System Time** dialog opens. Set the system time appropriately and click **OK**.	
3	Click on the **Manual Forecast Button**.	
4	The **Manual Forecast Panel** will open, allowing you to select a workflow to run. In the Workflow List, select the MEFP_Forecast workflow and press the F12 key.	
5	In the **Manual Forecast Panel**, click Run.	
6	When MEFP Forecast is done, you should see "Workflow MEFP_Forecast Completed" in the logs panel: (see Figure 2 below)	

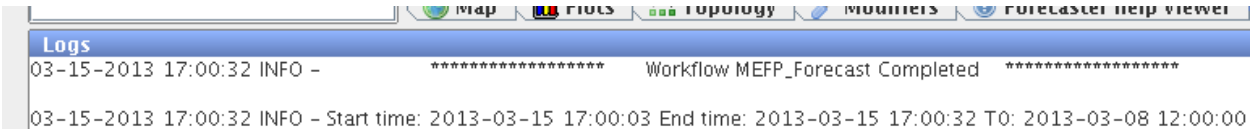


Figure 2

#	Action	Expected Results
7	To verify that ensembles were generated, click in the **Logs Panel**, hit the <F12> key, and hit the <J> key to open the **Database Viewer**.	1 open most recent current forecast 2 open most recent forecast and adj 3 run last created task 4 open last forecast for selection 5 set system time to last available fc 6 save temporary time series 7 ids visible 8 names visible 9 descriptions visible A verbose location tool tips B clear time series memory caches C run workflow test D restart E load time series info F compact local cache G rolling barrel local data store H delete local data store I acknowledge all J open database viewer K open workflow navigator
8	MEFP_Forecast should be the last workflow you ran. Double click to open it. See Figure 3 below	

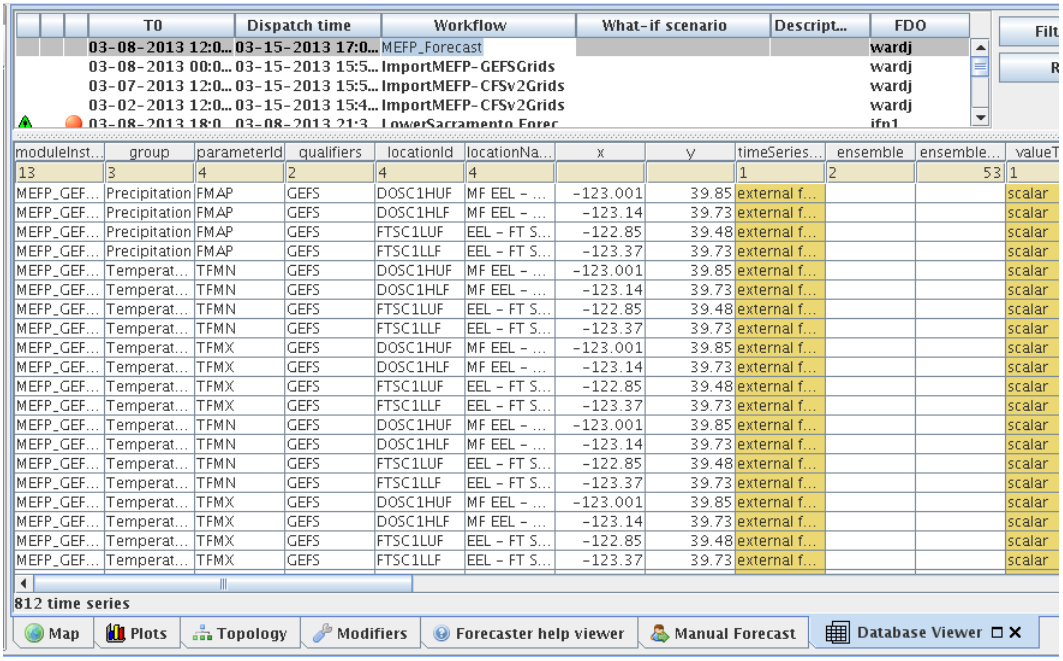
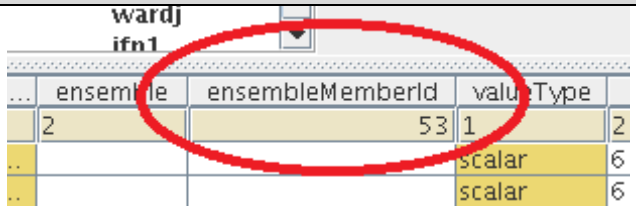
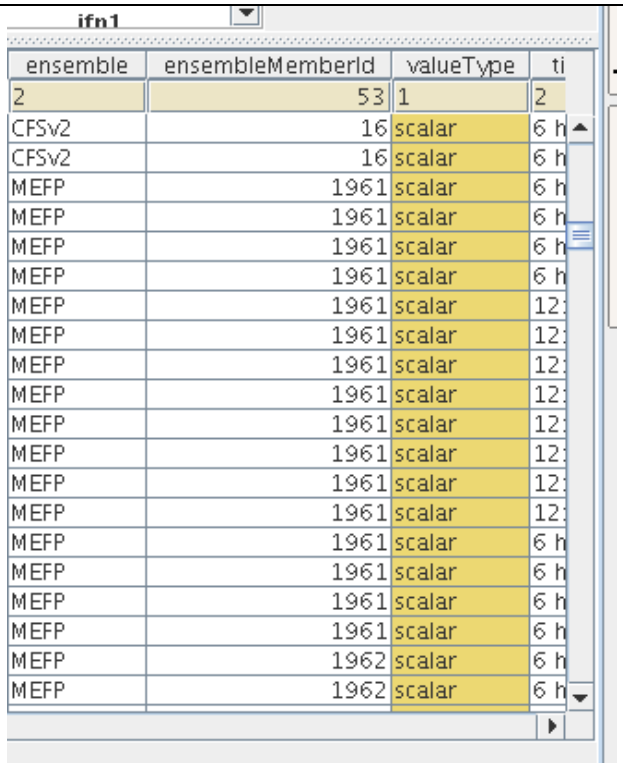
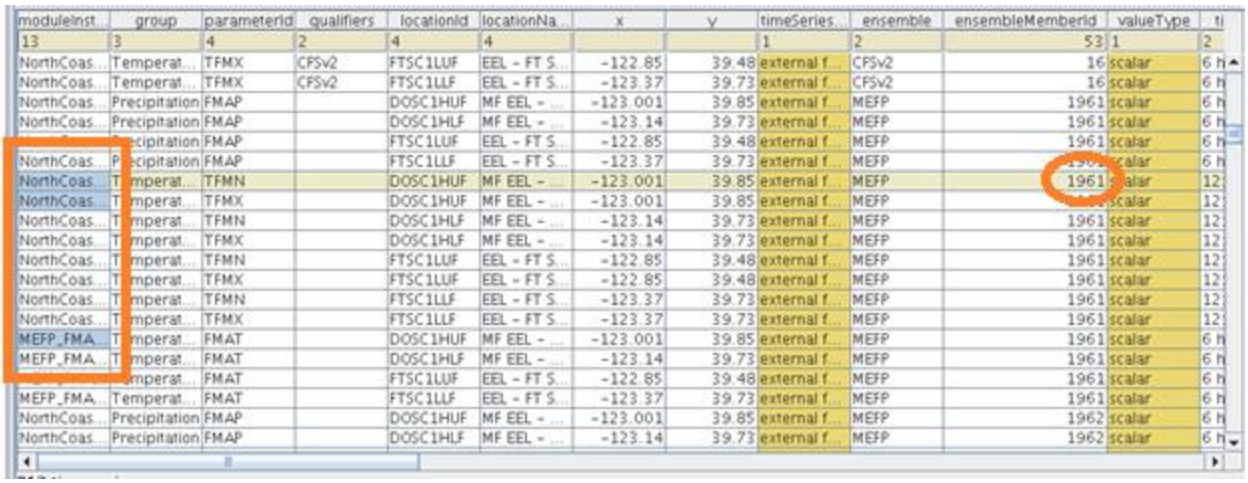


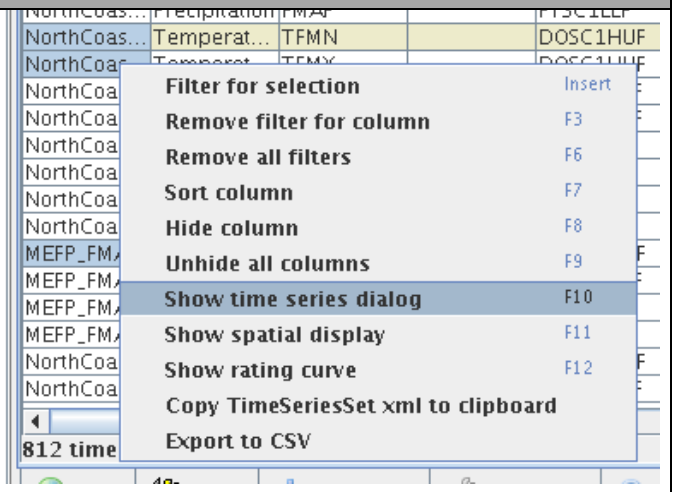
Figure 3

#	Action	Expected Results
9	Click on the "**ensembleMemberId**" column to sort by it. You may have to expand the column to see the full name.	
10	Scroll down to **ensembleMemberId** (year) 1961.	
11	Pick a **locationId**. This will vary between RFCs. In our example, locationId DOSC1HUF was chosen. <Shift> + left click to select the TFMN, TFMX, and FMAT for that location, and for one ensemble member index (1961, in Figure 4 below).	



moduleInst	group	parameterId	qualifiers	locationId	locationNa...	x	y	timeSeries...	ensemble	ensembleMemberId	valueType	ti
13	3	4	2	4	4			1	2	53	1	2
NorthCoas...	Temperat...	TFMX	CFSv2	FTSC1LUF	EEL - FT S...	-122.85	39.48	external f...	CFSv2	16	scalar	6 h
NorthCoas...	Temperat...	TFMX	CFSv2	FTSC1LLF	EEL - FT S...	-123.37	39.73	external f...	CFSv2	16	scalar	6 h
NorthCoas...	Precipitation	FMAP		DOSC1HUF	MF EEL - ...	-123.001	39.85	external f...	MEFP	1961	scalar	6 h
NorthCoas...	Precipitation	FMAP		DOSC1HLF	MF EEL - ...	-123.14	39.73	external f...	MEFP	1961	scalar	6 h
	ecipitation	FMAP		FTSC1LUF	EEL - FT S...	-122.85	39.48	external f...	MEFP	1961	scalar	6 h
NorthCoas...	P ecipitation	FMAP		FTSC1LLF	EEL - FT S...	-123.37	39.73	external f...	MEFP	1961	scalar	6 h
NorthCoas...	T mperat...	TFMN		DOSC1HUF	MF EEL - ...	-123.001	39.85	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMX		DOSC1HUF	MF EEL - ...	-123.001	39.85	external f...	MEFP		scalar	12
NorthCoas...	T mperat...	TFMN		DOSC1HLF	MF EEL - ...	-123.14	39.73	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMX		DOSC1HLF	MF EEL - ...	-123.14	39.73	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMN		FTSC1LUF	EEL - FT S...	-122.85	39.48	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMX		FTSC1LUF	EEL - FT S...	-122.85	39.48	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMN		FTSC1LLF	EEL - FT S...	-123.37	39.73	external f...	MEFP	1961	scalar	12
NorthCoas...	T mperat...	TFMX		FTSC1LLF	EEL - FT S...	-123.37	39.73	external f...	MEFP	1961	scalar	12
MEFP_FMA...	T mperat...	FMAT		DOSC1HUF	MF EEL - ...	-123.001	39.85	external f...	MEFP	1961	scalar	6 h
MEFP_FMA...	T mperat...	FMAT		DOSC1HLF	MF EEL - ...	-123.14	39.73	external f...	MEFP	1961	scalar	6 h
	mperat...	FMAT		FTSC1LUF	EEL - FT S...	-122.85	39.48	external f...	MEFP	1961	scalar	6 h
MEFP_FMA...	Temperat...	FMAT		FTSC1LLF	EEL - FT S...	-123.37	39.73	external f...	MEFP	1961	scalar	6 h
NorthCoas...	Precipitation	FMAP		DOSC1HUF	MF EEL - ...	-123.001	39.85	external f...	MEFP	1962	scalar	6 h
NorthCoas...	Precipitation	FMAP		DOSC1HLF	MF EEL - ...	-123.14	39.73	external f...	MEFP	1962	scalar	6 h

Figure 4

#	Action	Expected Results
12	Right click and select "**Show time series dialog**". The **Database Viewer** will appear. TFMX is shown in red at top, TFMN is shown in blue at top, and generated FMAT is shown on the bottom. See Figure 5 below.	

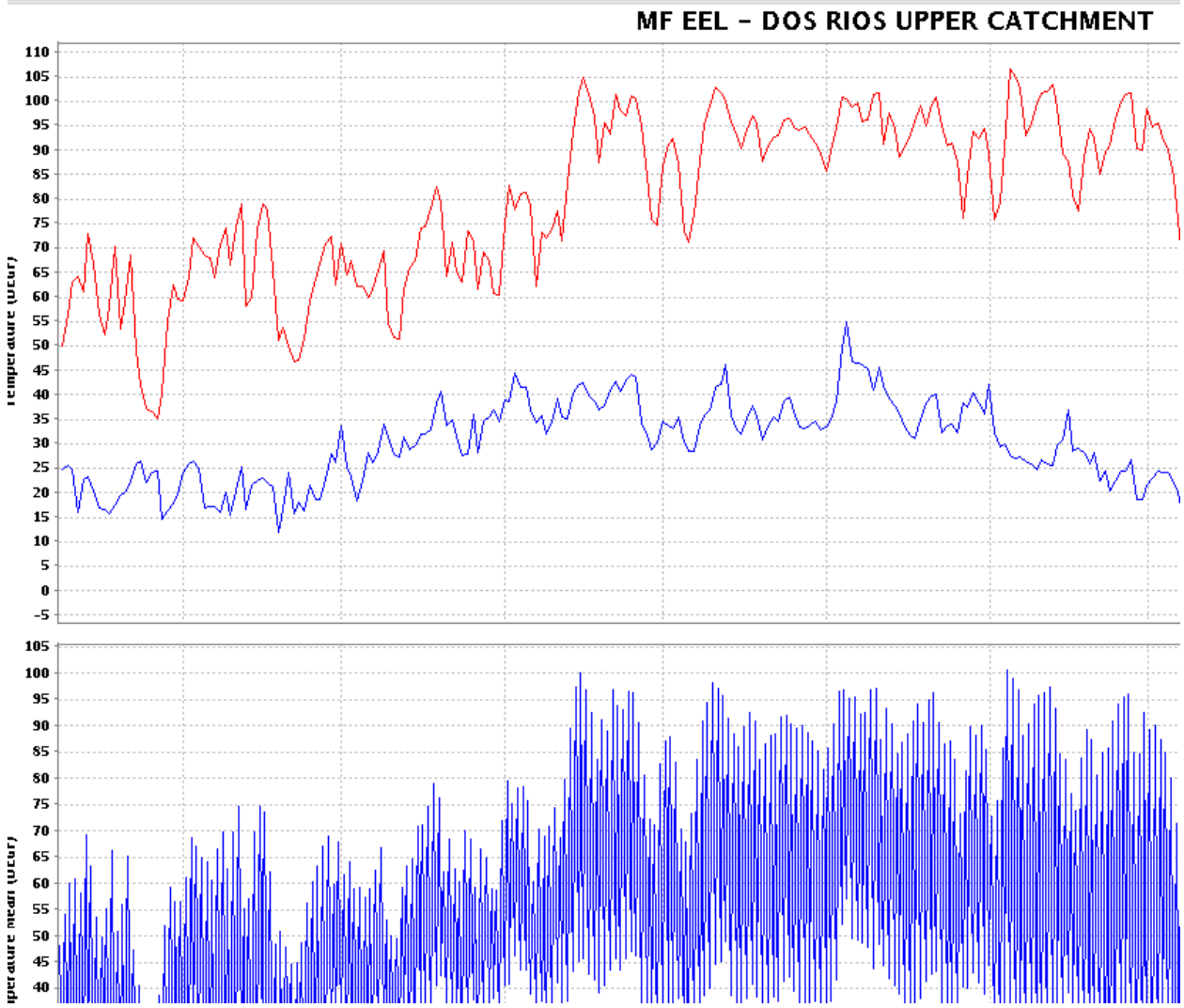


Figure 5

#	Action	Expected Results
13	For a better view, select a region of the **Database Viewer** by clicking and dragging a small rectangle from upper left to lower right. The generated FMAT should lie between the max and min temps. See Figure 6 below.	

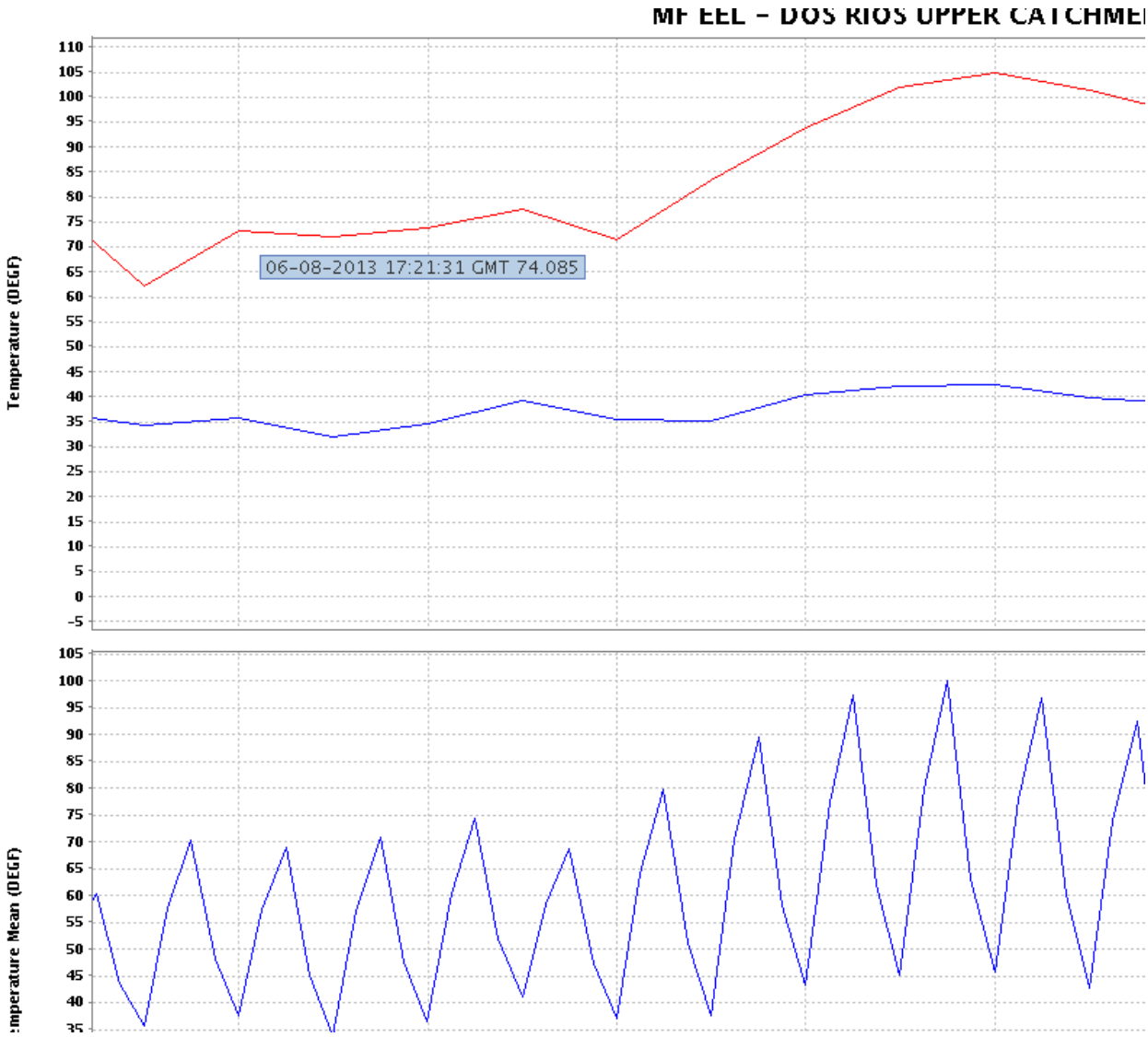

MF EEL – DOS RIOS UPPER CATCHME
Temperature (DEGF)
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
06-08-2013 17:21:31 GMT 74.085
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35

Figure 6

2.5 EnsPost

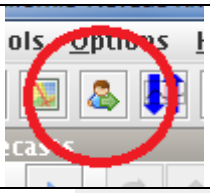
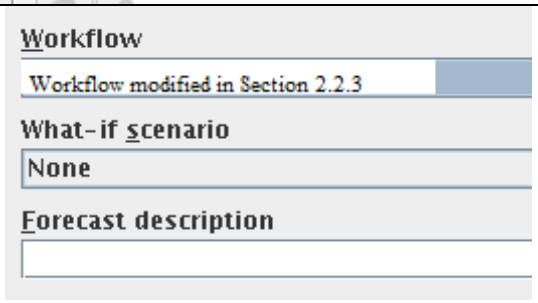
2.5.1 Test Prerequisite

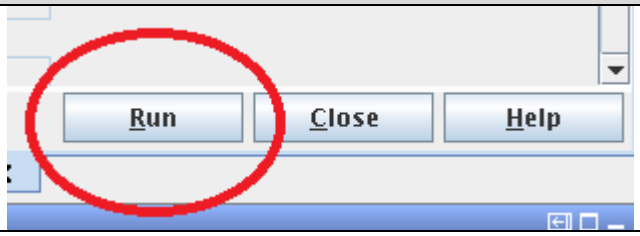
CHPS is configured with the EnsPost components as described in the document *EnsPost Configuration Guide*. Below is the same information from the confirmation section of the configuration guide. EnsPostPE is installed as described in the *EnsPostPE Configuration Guide.* The parameters .tgz file must be in the following format:

<LocationID>.<ParameterID>.enspost.parameters.tgz

Identify a workflow that generates an ensemble of stream flow forecasts. It can be an MEFP-based ensemble (see the *MEFP Configuration Guide: Forecast Components*) or an existing ESP workflow.

2.5.2 Test Procedure

#	Action	Expected Results
1	Start FEWS using the installation standalone: ***cd*** *<region_dir>* ***cd ..*** ***./hefsPlugins/fews_hefsPlugins.sh ##rfc_sa &***	FEWS will be started. The splash screen displayed will vary by RFC. The default splash screen is:  After a short time, the CHPS interface will open.
2	Click on the **Manual Forecast Button**.	
3	The **Manual Forecast Panel** will open, allowing you to select a workflow to run. In the Workflow List, select the workflow modified in the *EnsPostPE Configuration Guide*.	

#	Action	Expected Results
4	In the **Manual Forecast Panel**, click Run.	
5	Once the workflow is done.	You should see "Workflow Completed" in the logs panel. For example, "Workflow HEFS Forecast Completed"
6	Open the Database viewer in order to confirm that EnsPost successfully ran.	Select the workflow that was just completed in the database viewer, and find entries with the EnsembleID of HEFSENSPOST.

2.6 GraphGen

2.6.1 Test Prerequisite

CHPS is configured with the GraphGen components as described in the document *HEFS Graphics Generator Products Installation Guide*. Below is the same information from the confirmation section of the configuration guide. A localDataStore containing MEFP generated forecast ensembles, MEFP-based generated streamflow ensembles, and/or EnsPost post-processed streamflow ensembles.

2.6.2 Test Procedure

#	Action	Expected Results
1	Execute the workflow GraphGen_Create_HEFS_Products created in the *HEFS Graphics Generator Products Installation Guide* via the CHPS interface **Manual Forecast Panel** as normal (start CHPS, set the PI-service port number, open the panel, show all workflows, select the workflow, and click **Run**).	The HEFS product files will be created in the standard location (i.e., <*products_dir*>) specified by the baseOutputDir run file property (see *HEFS Graphics Generator Products Installation Guide*). The images will appear similar to Figures 7 - 9 shown below:

- *MEFP Results*: MEFP generated forecast ensembles of 6-hour FMAP and FMAT time series.

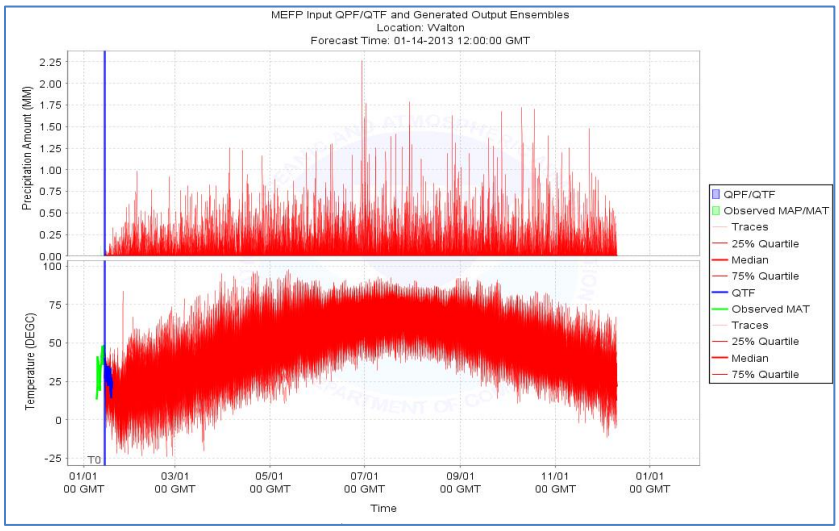


Figure 7

- *HEFS EnsPost Input*: Streamflow ensembles that are input to the HEFS EnsPost. If HEFS EnsPost is not used, the products can be used to display any streamflow ensemble.

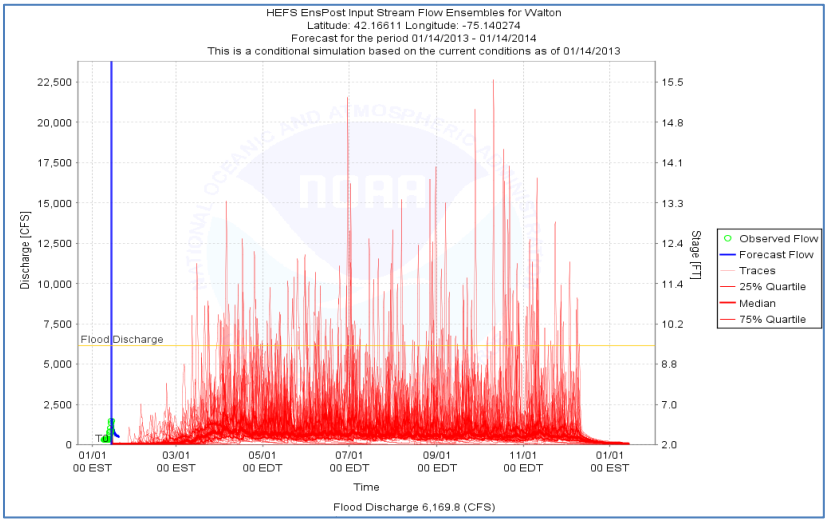


Figure 8

- *HEFS EnsPost Output*: Streamflow ensembles that are post-processed and output by the HEFS EnsPost.

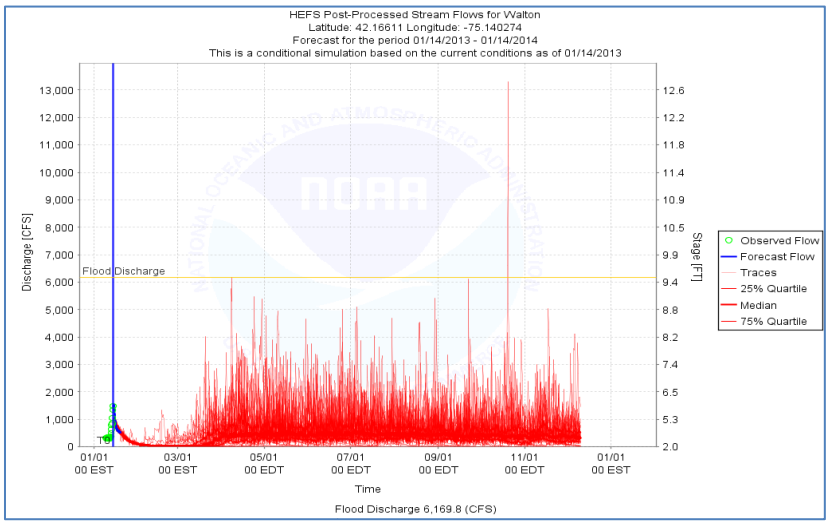


Figure 9

3 Testing Fixes

3.1 List of FogBugz tests

FogBugz ID	Tester	Test Procedure	Title
889	CNRFC	N/A	CFSv2 Precip too high
1091	CNRFC	Yes	GDS Exception Error
1239	CNRFC	N/A	EnsPost Hindcast Heap Memory Usage
1243	ABRFC	Yes	MEFPPE Issues with HEFS 1.0.1
1275	CNRFC	N/A	EnsPost Config Error: index >= size
1344	ALL	Yes	Removing GFS from MEFP Workflows
1369	CNRFC	N/A	MEFP Grid-Basin Relationship
1384	NERFC	Yes	MAT to TAMN Transform Problem

3.2 FogBugz 1091 – GDS Exception Error

3.2.1 Description

Error creating database connection, program will not launch.

3.2.2 Cause

The part of the code that downloads grids first places them under /tmp. It then compares the downloaded file with previously downloaded files and, if they are different, it moves the tmp file to the permanent location, overwriting any existing files (this is done to avoid updating the file's last modified time when the file wasn't modified, which in turn would cause the MEFPPE interface to display too many yellow warning icons in its summary tables). The problem is that, if they are the same, it would do nothing with the /tmp file; it should delete it, but it doesn't.

3.2.3 Fix

Properly delete /tmp files.

3.2.4 Test Procedure

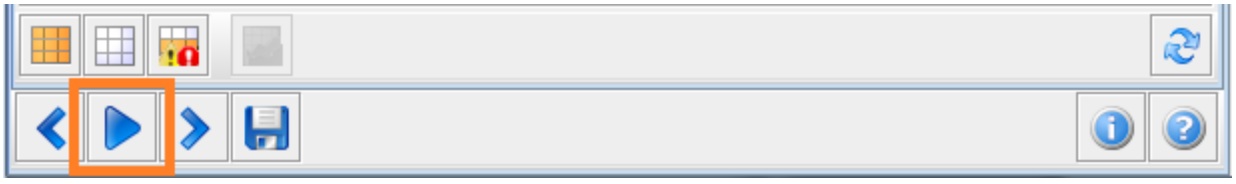
3.2.4.1 Test Setup

A parameter estimation SA.

3.2.4.2 Test Overview

Start the SA, open MEFPPE, and switch to the **GEFS Forecasts Panel**:

Download GEFS reforecast grid files for at least one location by selecting a location from the **Summary of Available Locations Table** and clicking on the **Perform Step Button**:



Perform the step a second time for the same location. Check the /tmp directory and verify that no files exist similar to the following:

```
ohd.hseb.hefs.utils.TempFile_<##big number##>.tmp
```

When grid files are downloaded, they are placed in a .tmp file by this name and compared with the gridded reforecast files already downloaded in the MEFPPE run area. If it does not match or

if there is no existing grid file, then the .tmp file is copied into the MEFPPE run area. If it does match, then the tmp file should be removed. If it is not removed, then this test fails.

3.3 FogBugz 1243 – MEFPPE Issues with HEFS 1.0.1

3.3.1 Description

4 issues reported with HEFS 1.0.1 MEFPPE:

1. We can only pull up the export MAP/MAT/TMAX/TMIN window once before it crashes CHPS.
2. Doing a large copy of the RFC SHEF code to other ids causes a 'do you want to quit the application?' error.
3. While doing MAP estimations, the random estimation icons remain yellow.
4. When doing a run-all CHPS would not always remove the old progress bars for already completed locations. These show up on the top and are never removed.

Other small enhancements made to MEFPPE will also be outlined below in the Notes.

3.3.2 Cause

1. There is a memory issue with how the getTimeSeriesHeaders() method in the Deltares PI-service runs. Using an ABRFC parameter estimation stand-alone, which included historical data for 100+ points, the method would require about 1.5 GB of memory while testing in HEFS 1.0.2. I assume this is the same for HEFS 1.0.1, and it indicates the method must be reading in the entire time series in order to acquire the headers.

2. The copy-to-all option for the RFC SHEF code column was accidentally removed.

3. This is a symptom of a more general problem of updating the icons of the Location Summary Panel was when a run-all job is performed.

4. There are multiple places in the code where if an exception occurs during parameter estimation, a progress bar would not be appropriately removed, causing left-over progress bars to stick around for the next segment.

3.3.3 Fix

1. No fix is planned, but a work-around is to break the parameter estimation stand-alone into multiple stand-alones, each intended to access only a subset of the MEFP locations. To do so, create a copy (or copies) of the base stand-alone and modify the PiServiceConfigFiles/MEFPPE.xml for each stand-alone so that only some of the time series are returned.

2. The copy-to-all option has been restored.

3. The icons now update appropriately and an hourglass icon to indicate the parameters for a point are being estimated has been added.

4. Progress bars are now removed.

3.3.4 Notes

A default button has been added in the canonical events panel to reset events to their delivered, default values.

A backup has been added to the run-time-info system file so it can be recovered if it becomes corrupt.

A button to allow for loading estimation options used for estimating a specific set of parameters has been added to the Estimation Panel.

Undo and redo buttons have been added to the Estimation Options Subpanel within the Estimation Panel to allow for undoing and redoing changes to the estimation options.

3.3.5 Test Procedure

3.3.5.1 Test Setup

Identify a parameter estimation SA to use for this test. To avoid changing an existing SA, it is okay to run this test using a new parameter estimation SA (i.e., with an mefppeRunArea that matches that delivered in the release tar file).

Locate the following file within a check-out of the HEFS hefsplugins code:

```
…/hefsplugins/testdata/testBed.tgz
```

Extract the import files for precipitation (on one line):

```
tar -zxvf testBed.tgz
testBed/import/control/base_events_precip_v2.txt
testBed/import/control/modulation_events_precip_v2.txt
```

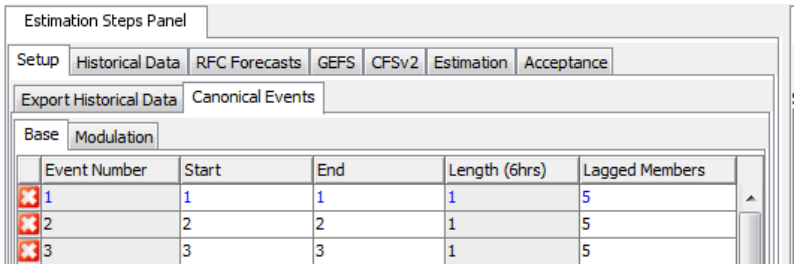
Copy the two files into the parallel directory in the mefppeRunArea:

```
cd testBed/import/control
```

```
cp base_events_precip_v2.txt modulation_events_precip_v2.txt
<mefppeRunArea>/import/control/.
```

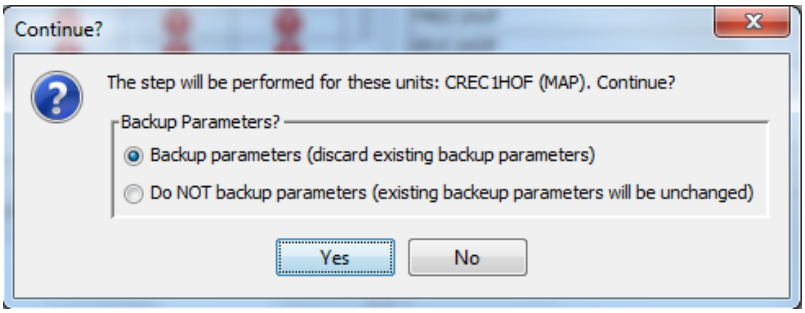
3.3.5.2 Test Overview

Start the parameter estimation SA, open the MEFPPE and make the **Canonical Events Panel** within the **Setup Panel** active:

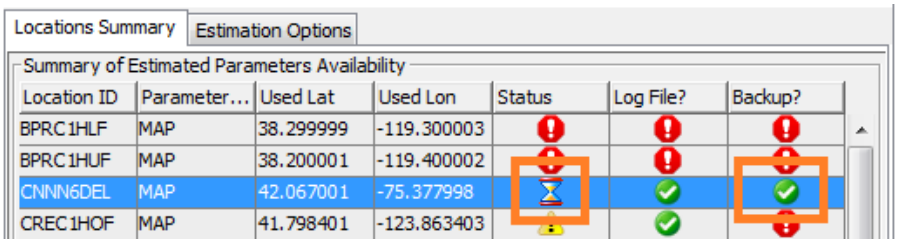


When MEFPPE started, it should have loaded modulation events; switch to the **Modulation Subpanel** (click the tab) and verify that events are defined in the table. Click on the **Restore Defaults Button** below the event table and confirm that the modulation events are removed.

Open up the MEFPPE and perform the estimation step. After clicking on the run button,  , the **Continue Dialog** should open allowing you to specify if the existing parameters should be backed up:

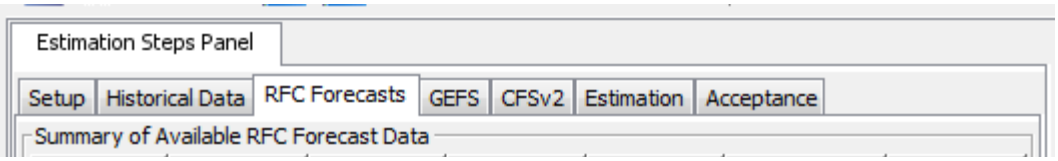


If backup parameters exist, a green checkmark will be displayed in the 'Backup?' column of the **Summary of Estimated Parameters Availability Table**. Estimate the parameters and leave the option "Backup parameters…" selected when the **Continue Dialog Opens**. Pay close attention to the icons. If the 'Backup?' icon becomes a green checkmark and the 'Status' icon becomes an hour glass, it is running as expected:

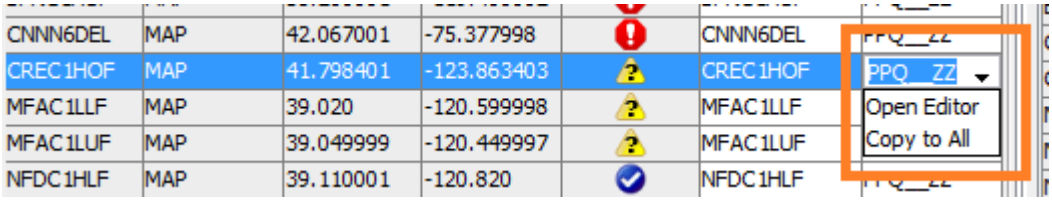


To test the 'Do NOT backup…" options, select another location for which no backup parameters exist ('Backup?' column is a red exclamation mark). Estimate its parameters, but select the 'Do NOT backup…" option from the **Continue Dialog**. Confirm that the 'Backup?' column does <u>not</u> become a green checkbox during and after the parameters are estimated.

Start the SA, open MEFPPE, and switch to the **RFC Forecasts Panel**:



Click on any cell in the column 'SHEF Code' and verify that it is an editable choice box (i.e., you can type in a value or select either 'Open Eidtor' or 'Copy to All':



Change the SHEF Code, press <Enter> and then click on the cell again and select 'Copy to All'. Confirm all cells in the column are set to your changed value. Change the SHEF Code cell back to the original value and select 'Copy to All' again. Confirm that the values are changed for all cells to the original value.

3.4 FogBugz 1344 – Removing GFS from MEFP Workflows

3.4.1 Description

GFS forecast source is removed from workflows, leaving the forecast sources RFC, GEFS, and CFSv2 as is.

3.4.2 Cause

GFS has been discontinued.

3.4.3 Fix

There is a long list of files to be edited, see FogBugz 1344 for the complete list.

3.4.4 Notes

The files changes must be done at each RFC. Besides those files listed in FogBugz 1344, other RFC customized configuration files may have GFS references that need to be removed too.

3.4.4 Test Procedure

3.4.4.1 Test Setup

This test uses the stand-alone for operational MEFP forecasting and the stand-alone for parameter estimation.

3.4.4.2 Test Overview

Perform the following tests:

- Follow the steps in FogBugz 1344 to remove GFS from configuration files in the existing HEFS operational regression testing stand-alone. Run MEFP Workflows and confirm it still works as expected. This will test both the configuration changes and the ability of MEFP to work with old parameter tar-balls that include GFS information in them.
- Open the MEFPPE in the parameter estimation stand-alone and confirm that GFS no longer shows up in the interface.

3.5 FogBugz 1384 – MAT to TAMN Transform Problem

3.5.1 Description

The current step plot indicates that each TMIN value is recorded at the end of the 12Z-12Z 24-hour period to which it applies (i.e., each blue flat line step ends at the blue scatter point triangle).

3.5.2 Cause

The 24-hour TMIN values are recorded at the beginning of the 12Z-12Z 24-hour period (TMAX is recorded at the end).

3.5.3 Fix

The diagnostic plot is fixed so that the flat line steps will start at each scatter point for TMIN data. The TMAX plot will be unchanged.

3.5.4 Test Procedure

3.5.4.1 Test Setup

A parameter estimation SA with parameters estimated for multiple locations.

3.5.4.2 Test Overview

Start the SA, open MEFPPE, switch to the temperature data type (choice box at the top of the **Location Summary Panel** in the upper right of the interface), switch to the **Historical Data** tab. Select a row corresponding to a location with data in the **Summary of Available Historical Data Table** and view the diagnostic plot by clicking on the **View Button**,  .
Zoom in on the data if necessary and verify the following:

- The legend entry color for TMIN matches the data plotted (the TMAX data should also match, but this was not a problem before).

- The scatter point for each TMIN data value is at the beginning of a flat-line that is 24-hours in length. The TMAX plot, which should not have been changed as a result of this, should have scatter points at the end of each 24-hour flat line.

4 Testing Enhancements

4.1 List of enhancement tests

FogBugz ID	Tester	Test Procedure	Title
1253	CNRFC	Yes	MEFP RFC Observation
1265	ALL (Optional)	Yes	EnsPost Use of Location and Module Instance Sets
1367	CBRFC	Yes	Add Output of Diagnostics Graphics to MEFPPE
1371	ALL (Optional)	N\A	Restricting Permission on HEFS Workflows and Buttons
N\A	OHD	N\A	MEFPPE – Load Estimation Options Button and Undo Button

4.2 FogBugz 1253 – MEFP RFC Observation

4.2.1 Description

Users must import the same precipitation observations twice in two different formats. During MEFP precipitation parameter estimation, RFC forecast and observation data is loaded. Is there a way to utilize the datacard files already imported into the CHPS database as RFC observations rather than having to reformat the datacards into the required format?

4.2.2 Cause

The historical data used for parameter estimation is a combination of the datacard data and RFC observations; the historical datacard data has priority and RFC obs is only used to fill in the gaps and extend the data. However, if a forecast source, such as RFC, provides its own observed data, that data is always used for parameter estimation instead of the historical data. Furthermore, MEFPPE requires both observed and forecast data for the RFC forecast source. Thus, the datacard data plays no role in RFC parameter estimation.

4.2.3 Fix

The RFC observed data is not required by MEFPPE for the RFC source. If it is not provided or is empty or all missing, then the regular historical datacard data is used. If it is provided and *any* data is not missing, then it is assumed that the observations for the RFC source are fully specified and specifically designed to be used with the RFC forecasts; therefore, the datacard data will not be used. In this case, it will not be merged with the datacard data, because it is not clear which would receive priority, datacard data or RFC obs, and the priority could vary by RFC. Thus a user must either provide ALL RFC observations in the obs file or no observations at all.

4.2.4 Test Procedure

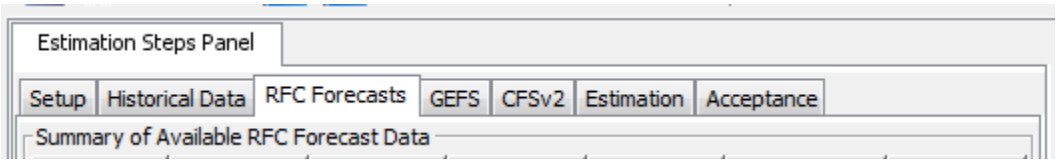
4.2.4.1 Test Setup

In the parameter estimation SA, move the observed RFC files aside in the mefppeRunArea:

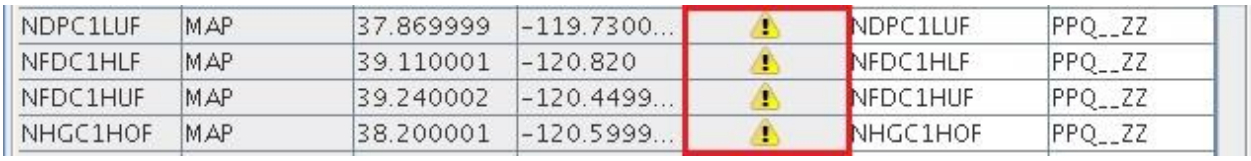
```
cd <mefppeRunArea>/rfcForecastData

mv rfc_pobs06  rfc_pobs06.bak

mkdir rfc_pobs06
```

4.2.4.2 Test Overview

Start the SA, open MEFPPE, and switch to the **RFC Forecasts** Panel:



Confirm that the locations for which RFC forecast data is available show yellow exclamation mark since they no longer have observed data; for example:



Switch to **Estimation** Panel, estimate the parameters for one of the locations and confirm that parameters are still estimated. CNRFC uses historical data that is extended from the original datacard data to include observations that cover the RFC source forecast period. Hence, parameters should still estimate successfully.

Move the original rfc_pobs06 directory moved aside during the Setup phase back into place.

4.3 FogBugz 1265 – EnsPost Use of Location and Module Instance Sets

4.3.1 Description

EnsPost requires a separate .xml file per location. Is there a way to utilize LocationSets and ModuleInstanceSets so that the number of xml files can be greatly reduced?

4.3.2 Cause

EnsPost, during development, was viewed as equivalent to SACSMA or SNOW-17, in that it would need to be configured one per segment/forecast point.

4.3.3 Fix

EnsPost was enhanced so it can run in a loop for a group of locations.

4.3.4 Test Procedure

4.3.4.1 Test Setup

Use an existing EnsPost test environment that uses two locations.

4.3.4.2 Test Overview

Perform the following tests:

- Modify the existing ENSPOST ModuleConfigFiles by adding the two parameter file names using the parameterFile.LOCID run file property. For example:
  - <string key="parameterFile.HUNP1ESP" value="HUNP1ESP.QINE.enspost.parameters.tgz"/>
  - <string key="parameterFile.NFDC1" value="NFDC1E.QINE.enspost.parameters.tgz"/>
- Make sure the appropriate inputs are setup for both locations as well.
- Run the workflow and confirm that the output ensembles for both locations were created.

4.4 FogBugz 1367 – Add Output of Diagnostics Graphics to MEFPPE

4.4.1 Description

The only way to save MEFP parameter diagnostics is to open the SA, view an image and save them one at a time. This is not practical when needing to save over 600 images.

4.4.2 Cause

Working as designed.

4.4.3 Fix

Diagnostic images can be batch created.

4.4.4 Test Procedure

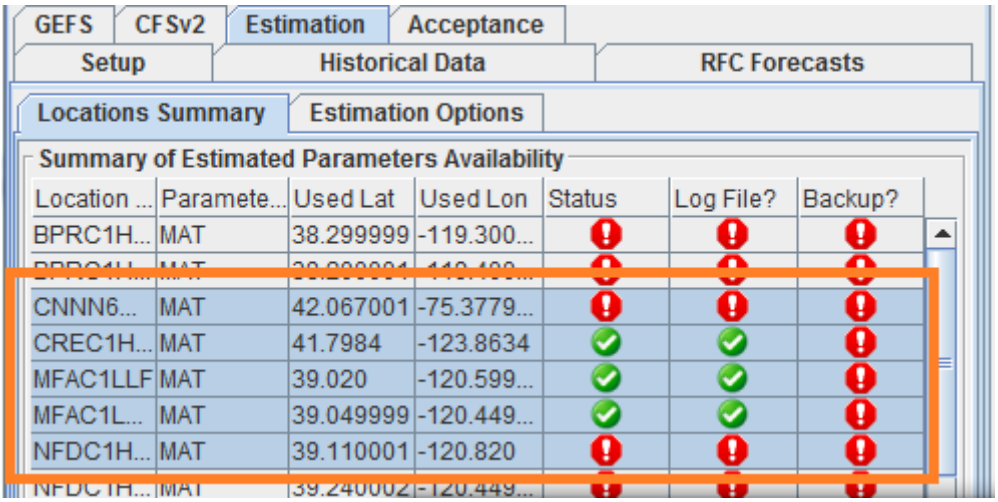
4.4.4.1 Test Setup

Find a parameter estimation SA with parameters estimated for multiple locations.

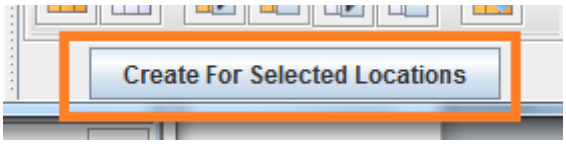
4.4.4.2 Test Overview

Start the SA, open MEFPPE, and view a block parameter diagnostic within the **Parameter Diagnostic Panel**. This requires loading the parameters and clicking on the **View Parameter Diagnostics Button**:

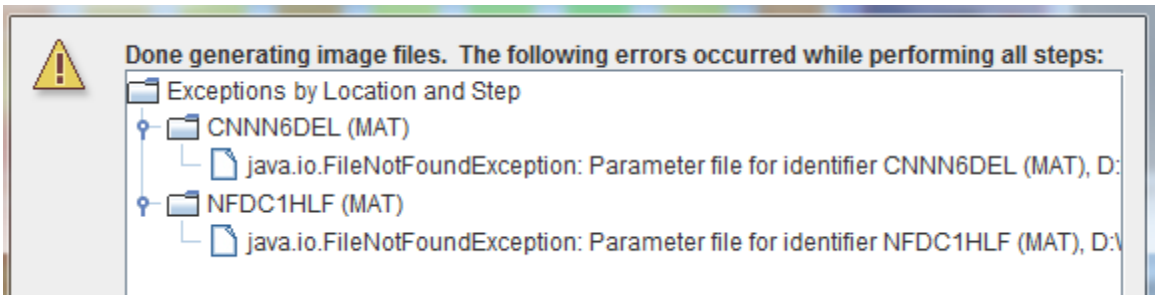
In the **Summary of Estimated Parameters Availability Table** of the **Location Summary Panel**, select multiple rows for which parameters have been estimated. If possible, select a few rows for which no parameters are estimated as well. Use the <shift> and <ctrl> keys while clicking to select multiple rows. For example:



In the **Parameter Diagnostics Panel**, click on the **Create for Selected Locations Button** in its lower right corner:



Specify a prefix of TESTING in the first dialog and select a directory in the second dialog. Upon clicking **Generate Images** in the second dialog, a progress dialog will open displaying the progress of diagnostic image generation. When the image generation process is complete, the progress dialog will close and an **Errors Dialog** will open. It will display the selected locations for which the image failed to generate and an associated error message. For example:



If you selected locations previously where parameters had not yet been estimated, you should see errors in the **Errors Dialog** for those locations.

Confirm that appropriately named images were generated in the output directory chosen earlier. Make sure that all of the images show the same parameter (check the plot title) but for a different location and displaying different data.